Mysore Agricultural Journal

Special Issue

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Cover: A Good Banana Bunch

[*Photo by P. R. R. Pillai*]

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48. The Director of Animal Husbandry Services in Mysore, Bangalore.
49. The Principal, College of Agriculture, Hebbal, Bangalore–6.
50. The Director of Horticulture in Mysore, Bangalore.
51. The Additional Development Commissioner, C.D. and N.E.S. Block, Bangalore.
52. The Registrar of Co-operative Societies in Mysore, Bangalore.
53. The Chief Marketing Officer in Mysore, Bangalore.
54. The Director of Public Instruction in Mysore, Bangalore.
55. Dr. Susheela Lingaiah, M.Sc., Ph.D., Principal, Maharani's College for Women, Bangalore.
56. The Director of Rural Industrialisation, Gandhi Nagar, Bangalore.
57. The Director of Social Welfare Centre, Bangalore.
58. The Director of Fisheries in Mysore, Bangalore.
59. Sri. A. Seshadri Iyer, B.Sc. (Ag.), I.F.Y.E. (*Secretary*).

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Secretary

MYSORE FARMERS' FORUM

Cenotaph Road

BANGALORE 2

B. D. JATTI.
Chief Minister.

"VIDHANA SOUDHA",
BANGALORE–1,
Dated 18th May 1961.

Message

I am glad to learn that the Mysore Farmers' Forum will be bringing out a Special Number of their Magazine to synchronise with their Annual General Body Meeting to be held at the end of this month.

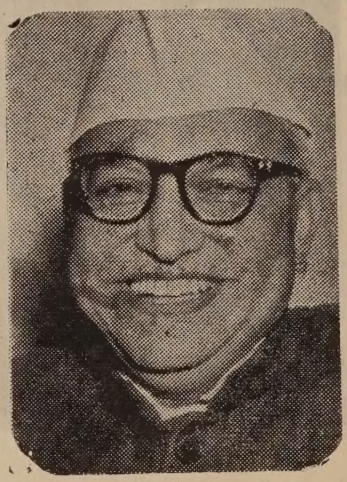
To-day, after thirteen years of our political independence, the country is not self-sufficient in food. Whatever may be the reasons, we have little justification for this failure on our part. It is the birthright of every one to be able to secure enough food for one's own sustenance. The Farmers' Forum has a significant role to play in solving this gigantic problem. May it be given to the Mysore Farmers' Forum to work hard in a spirit of service and prove worthy of the confidence reposed in them.

I wish your deliberations every success.

B. D. JATTI.

S. NIJALINGAPPA,
President,
Mysore Pradesh Congress Committee.

Message



Although the majority of Rural people are illiterate, they are highly cultured. I appeal to the rural people to adopt modern methods of cultivation. In several irrigational project areas most of the land has not been brought under cultivation as the farmers do not have sufficient money. Therefore, I request the Central and State Governments to set apart sufficient money to give financial assistance to farmers so that every bit of land which is available now can be cultivated. The need of the hour is not merely increasing the food production but it is also limiting the family.

I call upon the Farmers' Forum to launch a statewide campaign to bring new spirit and outlook among the farmers.

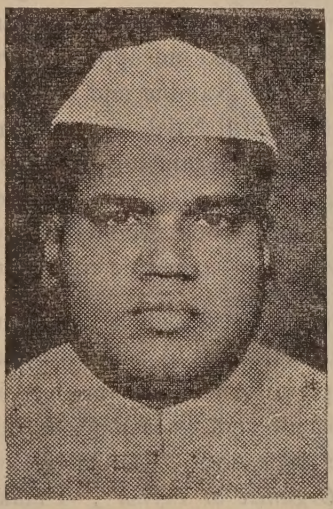
S. NIJALINGAPPA.

N. RACHIAH, B.A., B.L.,
Minister for Agriculture and Social Welfare, and President, Mysore State Farmers' Forum.

"VIDHANA SOUDHA",
BANGALORE-1,
Dated 21st May 1961.

Message

I am happy that our Farmers' Forum is bringing out a Special Issue of its Journal on the occasion of its Annual General Body Meeting which will be held on the 30th and 31st May 1961.



Development of Rural India largely depends on the betterment of farmers. Farmers have to raise their production by adopting modern methods of agriculture which would, in turn, bring them larger returns of income. Agriculture has to meet the increased demand for food, raw materials and supply of labour which arise from the growth of industry and progress of urbanisation. At the same time agriculture has to meet the challenge of population growth and the demand for improved nutrition. About 50% of our rural population is subject to malnutrition, under-nutrition and starvation. It is estimated that $\frac{2}{3}$rds of the Asian population goes hungry to bed every night. Indeed, hunger shatters all our Plans. The first and foremost duty of the State and Central Governments and every organisation and citizen in the country is to create an atmosphere of plenty, by removing the scourge of hunger. Organisations engaged in this activity should receive all encouragement and aid from Government. It is only when permanent employment, assured monthly minimum wage and other facilities are given to the workers, especially in the field of agriculture, animal husbandry, horticulture and fisheries, that the food problem can be solved affectively. I suggest that the

Government should make organisations like the Farmers' Forum and Young Farmers' Association responsible for the effective implementation of the programmes for increased food production under the Third Five-Year Plan. Ignorance, poverty and disease are the common enemies of mankind and to remove these impediments in the way of progress of a nation is the paramount duty of not only the Government but every one of us. All efforts of the Government and the people should be channelised to step up food production as per the targets set in the Third Five-Year Plan. This is the only way to liquidate hunger, ignorance, poverty and disease. I also emphasise the need for the farmers to give equal importance for the development of agriculture, animal husbandry, horticulture and fisheries. I make an appeal to the farmers and young farmers particularly to examine and see how best they could take advantage of the Shri Nijalingappa Committee's recommendations in the matter of organising voluntary co-operative farming and utilise the facilities offered by Government through such co-operatives to step up food production and solve the food problem, and to improve their economic condition.

I commend the work of the Farmers' Forum which is helping the farmers in Mysore to organise themselves to achieve better results. We see a number of people organising themselves in different sectors. It is more important and essential that our farmers should unite and organise themselves. The choice in this highly competitive society is "*Organise or Perish*". I make a fervant appeal to the farmers and the young farmers of the State in particular and the country in general, to respond to the call of the Farmers' Forum and Young Farmers' Association, for building up a strong and powerful organisation in the country through whose united efforts alone the country can solve the food problem.

We, farmers, in the words of Swami Vivekananda should 'arise, awake and stop not till the goal is reached'.

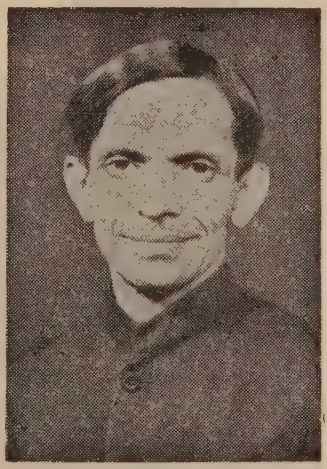
N. RACHIAH.

JAI HIND

KADIDAL MANJAPPA, B.A., LL.B.,
Minister for Revenue.

BANGALORE,
Dated 23rd May 1961.

Message



I am glad to learn that the Mysore Farmers' Forum is bringing out a Special Issue of their Magazine "Mysore Vyavasaya Patrike" to synchronise with their Annual General Body Meeting to be held in Bangalore at the end of this month.

As I write this message, I have before me a copy of the April issue of the Magazine and, going through it, I have no hesitation in saying that apart from serving as the mouthpiece of the Mysore Vyavasaya Sangha the Magazine, within its limited scope, helps the raiyats to know and apply modern methods of agriculture. The wide publicity given to prize-winners, who have secured record production of foodgrains and other agricultural produce, awakens a spirit of competition among the other raiyats and thus gives a fillip to agriculture.

I wish the Annual General Body Meeting all success and your Magazine my very best wishes.

KADIDAL MANJAPPA.

T. MARIAPPA, B.A., LL.B.,
Minister for Finance.

"VIDHANA SOUDHA",
BANGALORE-1,
Dated 18th May 1961.

Message

I am happy to know that the Mysore Farmers' Forum will be holding its Annual General Body Meeting on the 30th and 31st of May 1961. I send my greetings to the Farmers and wish the General Body Meeting and its deliberations all success.

T. MARIAPPA,

H. M. CHANNABASAPPA, B.Sc.,
Minister for Home.

BANGALORE,
Dated 17th May 1961.

Message

It gives me pleasure to learn that the Mysore Farmers' Forum is holding its Annual General Body Meeting on the 30th and 31st May 1961, at Bangalore and intends to bring a Special Issue of its Magazine—both Kannada and English. The activities of the Forum are too well known to require special mention. Suffice to say, that it is slowly working a silent revolution in the field of agriculture. I wish the Forum every success.

H. M. CHANNABASAPPA.

K. K. HEGDE, M.B.B.S., M.L.A..
Minister for Health.

"VIDHANA SOUDHA",
BANGALORE–1,
Dated 22nd May 1961.

Message

I am glad the Mysore Farmers' Forum will be holding its Annual General Body Meeting on the 30th and 31st of May 1961. I am sure matters of interest and importance to the farmers will be discussed at the General Body Meeting.

I send my best-wishes for the success of your deliberations and for a very bright future for the Mysore Farmers' Forum.

K. K. HEGDE.

H. S. RUDRAPPA, B.Sc., LL.B.,
Minister for Forests.

"VIDHANA SOUDHA",
BANGALORE-1,
Dated 22nd May 1961.

Message

It gives me great pleasure to know that the Mysore Farmer's Forum will be bringing a Special Issue of its Magazine on the occasion of its Annual General Body Meeting on 30th and 31st of this month. It is but appropriate that a Special Issue is being brought out on this occasion.

In these days of Scientific advancement, specific guidance to Agriculturists in regard to the use of improved varieties of seeds, manure, agricultural implements, etc., is an imperative need in order to keep abreast with the day-to-day progress of the Agricultural Industry. Though we have registered some progress in the field of Agricultural Production, the country has not yet become self-sufficient in food. While there is an increase of only 40 per cent. in Agricultural Production, in spite of largest number of people being engaged in this profession, the production on the Industrial side has gone up to 95 per cent. Hence there is necessity to focus our attention on intensive cultivation rather than extensive cultivation not only to increase our production but also to improve the deplorable economic conditions of small ryots. No doubt the Farmers' Forum has done and is doing yeoman service to the unenlightened farmers to kindle their untapped energy. But much remains to be done and the Forum has a sternuous task to face in this connection.

I wish all success to the Annual General Body Meeting of the Forum.

H. S. RUDRAPPA.

H. K. VEERANNA GOWDH.
Minister for Public Works and Electricity.

BANGALORE,
Dated 23rd May 1961.

Message

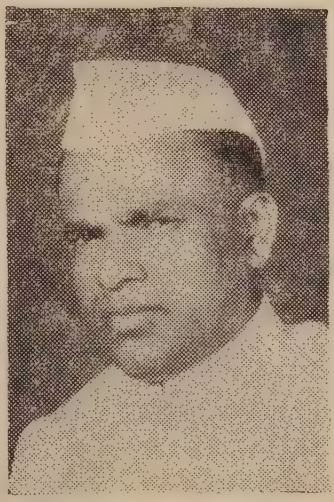
I am glad to learn that the Mysore Farmer's Forum is bringing out a Special Issue of their Magazine both in Kannada and English on the occasion of the General Body Meeting. I wish the publication success.

H. K. VEERANNA GOWDH.

H. C. Linga Reddy, B.A., B.L.,
Deputy Minister for Planning and Development.

"Vidhana Soudha",
Bangalore–1,
Dated 24th May 1961.

Message



The publication of a Special Issue of the Journal of Mysore Farmers' Forum at the time of the General Body Meeting to come off on the 30th and 31st of May is a happy idea.

Agriculture is the foundation of our rural life. Just like other sciences it grows on the acumulated experience of the practical farmers. If the farmers should be real devotees of the plough and winners of the golden grain they should pooi together the rich experience each has gathered.

If it is proposed that the latent experience of the farmers whose temple is the life-giving earth, whose life pulse is the toil of the day and whose daily worship is their occupation, agriculture were to come together and shed its light around. There is no hesitation that it should happen through an organisation like the Forum carrying its message through its publication like the Journal.

I wish success to the Annual Meet and hope that its message of the Forum to its members will flow like the river of milk.

H. C. Linga Reddy.

VEERENDRA PATIL,
Minister for Excise, Prohibition and Rural Industries.

"VIDHANA SOUDHA",
BANGALORE 1,
Dated 27th May 1961.

Message

I am happy to learn that the State Farmers' Forum is bringing out a Special Issue of its Journal on the occasion of its coming anniversary.

During the short period of its existence, the Forum has done magnificent work. Not the least of its achievements is that it has served as a clearing-house for ideas regarding farming practices. Through its periodical, *The Mysore Vyavasaya Patrike*, the Farmers' Forum disseminates valuable information regarding these practices and encourages the farmers to better their yields by adoption of modern methods of farming.

The Special Issue of your Magazine to be published on the occasion of your Annual General Body Meeting, has my very best wishes.

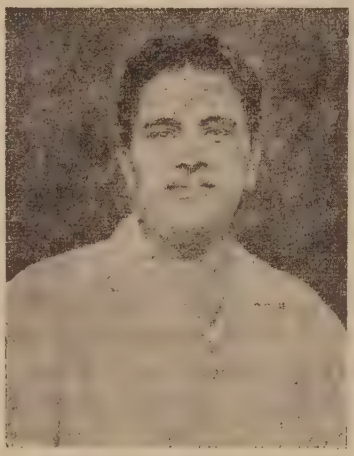
VEERENDRA PATIL.

M. V. RAJASEKHARAN,
Hon. Secretary,
Mysore Farmers' Forum.

"CENOTAPH ROAD",
BANGALORE-2,
Dated 31st May 1961.

An Appeal

People who live and work on the land around the world constitute a majority of the world people. If the people on the land had their way, I am sure that we could live in peace and that there would be no hunger anywhere. Although people who live and work on the land speak many different tongues, live in widely varying culture, their basic urges for setting their lot and that of their families are the same. Every person who lives on the land wants to manage and the land on which he works. Every one wants more education, health and food for himself and his family. Agriculture occupies the most prominent position in our country's economy and life, on it depends not only the food and sustenance of the country but also the economic prosperity, the progress of industries and almost everything which has to be developed. It is, therefore, necessary that all efforts which are directed towards the advancement of agricultural progress in the country should be strengthened.



A farmer can no longer be merely a producer. He must be associated more intimately with the task of national regeneration and protection of its interest and his well-being must be the prime consideration of all those who are connected with our national life.

Almost three-fourths of our population is dependent on Agriculture as an occupation. Food is the basic need for man. Man can live without many things but not without food. Our farmer, as the producer of our food, is our "*Annadhatha*".

With the food we produce, the nation is fed,
With the fibre and wool, it is dressed.
Since feeding and clothing both rest on the farmers,
the farmer himself cannot rest.

We who are fortunate enough to live in Mysore State which is rich in resources, people and the democratic tradition must make special efforts to understand the culture, the needs, the hopes and the motivations of our brothers who are tillers of the soil in all parts of the Mysore State.

The Government has been initiating many plans for the betterment of Agricultural Community. But it is my firm conviction that it is only through the Farmers' Organization that real progress could be registered in the country in the field of Agriculture. The Farmers have to be clearly told and also made to understand the function they have to perform. They have to be brought into closer contact with all the Agricultural Planning. Unless this is done—and this can be done only through an Organization of Farmers, for Farmers and by Farmers—it will not be possible to achieve results which you are all expecting to achieve.

I submit to you, on this occasion, to look upon agricultural profession as a sacred one and consider all questions connected with Agriculture in a dispassionate manner and help the farmers to build their own organization to build Rural India.

Lastly, I appeal to you with all humility to enrol yourselves as Life-Members and Active Members of the Mysore Farmers' Forum so that you can, not only understand and appreciate our programme and action but also be partners in building Rural India.

Thanking you,

M. V. RAJASEKHARAN.

PROCEEDINGS OF THE GOVERNMENT OF MYSORE

Subject : Instructions to be issued to certain Government servants to serve as Members of the Farmers' Forum.

Read:— Letter No. T 3357 dated 15-1-1957, on the above sudject from the Director of Agriculture and Chairman, Mysore Farmers' Forum, Bangalore.

Order No. AF. 10 MVS 57 *Bangalore, 1st May 1957*

1. Agriculture.
2. Revenue.
3. Community Project & N.E.S.
4. Horticulture.
5. Animal Husbandry.
6. Co-operative.
7. Marketing.
8. Education.
9. Home Science

The Heads of marginally noted Departments are permitted to serve as members of the Mysore Farmers' Forum Committee.

They may also permit the staff working under them in the District to serve as members of the Forum and extend all possible help and co-operation not involving Government in any financial commitments.

By Order and in the Name of the Governor of Mysore,

(Sd.) SAMUEL APPAJI,

for Secretary to Government, Agriculture and Forest Departments.

PROCEEDINGS OF THE GOVERNMENT OF MYSORE

Read :—

G.O. No. R. 6695-743/Agri. 107-12-13, dated 24-2-1914 according sanction for the reorganisation and development of the Department of Agriculture and the formation and the working of the Agricultural Associations.

(2) Correspondence ending with letter No. B 7-51-391/-56-57, dated 9-8-1956 from the Director of Agriculture stating that the Agricultural and Experimental Union formed in accordance with the above Government Order has been doing great service to the ryot class since one of the functions of the Department is to work in close association with the people and requesting in the circumstances explained therein sanction to treat the attention bestowed by the staff of the Agricultural Department for the activities of the Agricultural and Experimental Union as an official duty of the Department.

Order No. A F. 8625-6/Agri. 14-56-38, dated, Bangalore, the 30th October, 1956.

The proposal of the Director of Agriculture is approved.

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THE MYSORE FARMERS' FORUM

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AND LOOK FOR A PRIZE

TO YOU

AND

TO YOUR DISTRICT

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MYSORE STATE

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And help them with their projects
And treasure the pleasure
Of being with the younger ones
And working with them and for them

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Rs. 60·00 for Life

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Organisers have prizes to win
Each youngster can work to get a
Recognition for himself and his club.

To the club boys we say
Do your best; you may be the one
To bag a ticket for a free travel round India

Write to Secretary

YOUNG FARMERS' ASSOCIATION

CENOTAPH ROAD : : BANGALORE 2

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Chairman

Mysore Farmers' Forum Co-operative Cold Storage Society, Ltd.

C/o

Mysore Farmers' Forum

Cenotaph Road, BANGALORE 2

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Authorised Share Capital Rs. 2 Crores
One Share is Rs. 100

For details address

National Farmers' Co-operative Bank

C/o

Bharat Krishik Samaj
No. 1, West Nizamuddin
Mathura Road
NEW DELHI

OR

Secretary

Mysore Farmers' Forum
Cenotaph Road
BANGALORE 2

HOW THE MYSORE FARMERS' FORUM WORKS ?

10,000 Members

171 Taluk Committees (Taluk Farmers' Forums)

19 District Committees (District Farmers' Forums)

State Executive Committee (2 Representatives from each district and 8 Co-opted Members)

SUB-COMMITTEES

1. Standing Committee
2. Planning Committee
3. Editorial Committee
4. Commodity Committee

OFFICE

(1) President (Minister for Agriculture, Mysore)
(2) Chairman (Director of Agriculture in Mysore)
(3) 4 Vice-Presidents (1 for each Division of the State)
(4) Honorary Secretary
(5) Office Secretary
(6) Treasurer
(7) Members (Heads of all Development Departments are *Ex-officio* Members of the Forum Committee)

Forum is affiliated to the Bharat Krishik Samaj

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Mysore Farmers' Forum Executive Committee, 1960 and Friends

MYSORE FARMERS' FORUM (MYSORE VYAVASAYA SANGHA) THROUGH THE DECADES

By M. V. Rajasekharan*

The year 1918 will be remembered as highly memorable in the history of Mysore Agriculture, as, for the first time, the Agricultural and Experimental Union took its birth to serve the farmers of the State. It was in this year that "The Agricultural and Experimental Union" was started by Dr. Leslie C. Coleman, who was then the Director of Agriculture in Mysore State. The Union started its activities as a part of the Department of Agriculture with 30 farmers as its members. For a very long time in the early years of the Union it was the duty of the Secretary to send out a circular to the members each year requesting them to do some experiment on their farms with the materials to be supplied to them by the Department of Agriculture and report the results at the end of each year. The material for experiment was either an improved variety of seed, a sample of manure, a newly devised implement, a sprayer or a spraying chemical to control pests and diseases. That was how the Union came to be known as the "Experimental Union". Thus the object of the Union was to convey results of research conducted in the Departmental Laboratories and Research Stations to the fields of the farmers.

The membership of the Union started growing every year. The membership raised from 30 to 300 in the year 1924, to 2,000 in the year 1943, to 3,000 in 1945, to 5,000 in 1952. It reached to 8,000 in the year 1960 and at present its membership has reached a figure of 10,000.

The Mysore Farmers' Forum has got three kinds of membership: (1) Life-Membership—with a subscription of Rs. 110 for life. (2) Active Membership—with annual subscription of Rs. 6 (An active Member will get one monthly journal either in Kannada or in English) and (3) Ordinary Membership—with an annual subscription of Re. 1.

The Agricultural and Experimental Union affiliated to All-India Farmers' Forum in the year 1956. Since the beginning of its inception, the Forum has been trying to organise and educate the farmers to recognise their responsibilities to build up Rural India. The Forum believes that all positive steps should be taken to close the gap between

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what farmers can afford to pay for food and fibre and what they need to maintain a reasonable standard of living.

Education of the farmers is one of the main objectives of this organization. The Forum is keenly interested that farmers should develop a proper attitude towards scientific farming and should get trained to adopt improved methods of agriculture. The Forum is a non-political and non-sectarian association of agricultural producers and all those interested in the promotion of their welfare.

The Forum has got its State Office situated in Bangalore. It has its branches in the 19 districts of the State and Taluk Branches in most of the 171 Taluks of the State. It has got its own State Office building situated in a very central place of Bangalore City. Some of the District Forums and Taluk Forums have got their own buildings, constructed out of their own funds. The Forum has got further plans to see that the Farmers' Forum Buildings are built in all the District and Taluk Headquarters to serve better the farming community.

Objectives of the Forum.—The objectives of the Forum are:

(1) To study the problems facing the agricultural producers in Mysore State.

(2) To promote, advance and protect the social, economic and cultural interests of the agricultural producers, farm youth and farm women in the State.

(3) To undertake propaganda, training and education of farmers and co-operate with Governmental and other agencies for the upliftment and amelioration of the farming community and rapid progress or farming in the State.

(4) To assist in formulating and promoting State and National Agricultural policies, in the interest of the agricultural producers and to collaborate and co-operate with similar organisations of agricultural producers in the State or Nation for the furtherance of the said objectives.

(5) To take such steps for the fulfilment of the above objects as may be necessary from time to time, in particular, collection and expenditure of funds, undertaking publicity and publication of all kinds, to hold Meetings, Conferences, Seminars and Exhibitions, to send representatives, delegations, deputations, etc.

The State Organization.—The State Farmers' Forum is composed of one President (who is the Minister for Agriculture of the Mysore State), the Chairman (who is the Director of Agriculture in Mysore),

four Vice-Presidents, one from each Division, one Hon. Secretary, elected by the Executive Committee Members, one Office Secretary, who is deputed by the Department of Agriculture and two Members elected from each District, to be on the State Executive Committee. It is the Executive Committee which decides all the policy matters of the Organization. The President presides over all the Executive Committee Meetings. In the absence of the President and the Chairman, any one of the Vice-Presidents presides over the meetings. The Executive Committee meets four times in a year. The General Body of the Forum meets once in a year and reviews the work done in that year. The General Body also passes the budget for the coming year.

The Executive Committee.—The Executive Committee reviews, supervises and transacts all the business of the Forum. The Executive Committee appoints the Standing Committee and other Sub-Committees to carry out specific duties assigned to them by the Executive Committee. The Members of the Executive Committee and Office-Bearers of the Forum are elected for a term of one year. Members serve on the Executive Committee until their successors are elected.

At the District Level, there is an Executive Committee, composed of one non-official President elected by that Executive Committee, and one Honorary Secretary. The District Agricultural Officer is acting as *Ex-officio* Secretary of the District Farmers' Forum. In the Taluk Level, you find the same type of Executive with its Office-Bearers and an Agricultural Extension Officer or Agricultural Demonstrator acting as its *Ex-officio* Secretary.

Standing Committee.—The Standing Committee of the Forum is composed of all the Heads of the Departments of Government of Mysore as its Members and Director of Agriculture as Chairman. The Standing Committee meets once in a month and reviews the work of the Forum. Any subject which would come either before or after the Executive Committee Meeting will come before the Standing Committee for detailed discussion. The Standing Committee's recommendations are reviewed and implemented by the Executive Committee.

Planning Sub-Committee.—The Planning Sub-Committee is composed of Vice-Presidents and other members who have been elected by the Executive specifically for this Committee. The Committee meets whenever there is a need for it. This Committee reviews all the Agricultural Planning and submits its report to the Executive Committee either to recommend to Government or to implement.

Editorial Committee.—The Editorial Committee is composed of Joint Director of Agriculture (Research) and one or two officials of the Scientific Sections of the Department of Agriculture and the Secretary

of the Forum. The Editorial Committee meets every month and decides about all publicity matters in connection with the publication of Forum Journals both in Kannada and English.

Commodity Committees.—The Commodity Committees of the Forum meet once or twice in a year, to discuss about various commodities which are grown in the State. The Committees submit their report to the Executive Committee for implementation. At the time of Commodity Committee Meetings experts are invited and their advice is taken.

The Committees study the problems of cultivation and marketing of all important crops grown in Mysore State and the same information is disseminated to the Farmers through the District and Taluk Branches of the Forum.

Finances.—The State Farmers' Forum is financed by its membership dues and Government Grants. The Budget is prepared each year by the Executive Committee and presented to the Annual General Body for its approval. The Budget covers the next calendar year and shows the estimated receipts and expenses from all sources and on all items. The receipts will include last year's cash balance if there is any. Money is paid out by the Treasurer of the Forum, who is the Deputy Director of Agriculture, Bangalore. The Treasurer shall keep the record of all the receipts and expenditure together with the purpose of such expenditure.

The funds are diverted to all the 19 districts to carry out their programmes at the District Level.

Relationship with the Various Departments of Government of Mysore.—The Forum has got the closest relationship with the Department of Agriculture. The Minister for Agriculture in the State is the *Ex-officio* President of the State Forum. The Director of Agriculture is the *Ex-officio* Chairman of the State Forum. The District Agricultural Officers, Agricultural Demonstrators and Agricultural Extension Officers are *Ex-officio* Secretaries at District and Taluk Levels respectively. The Department has lent an Agricultural Extension Officer to work as the Secretary of the Forum at the State Office.

The Forum has got cordial relationship with Planning and Development Department. The Development Commissioner and the Additional Development Commissioner are on the Executive Committee of the Forum.

The Heads of all Departments of Government of Mysore are on the Standing Committee of the Forum.

Forum Publications.—The Forum is publishing every month 12,000 copies of Kannada Journal called *Mysore Vyavasaya Patrike* and 1,000 copies of the English Journal called *Mysore Agricultural Journal*, a quarterly.

Last year the Forum has brought out two very useful publications, namely, (1) *Handbook of Agriculture* and (2) *Farm Accounts.* The Forum is spending nearly 30–40 thousand rupees every year on printing. In recent years it has felt the need to possess its own printing press. The steps have already been taken to purchase a Printing Press to provide quick and useful information to farmers.

Library and Reading Room.—The State Office maintains a good Library which consists of 2,000 volumes providing information on various topics of Agriculture, Animal Husbandry, Horticulture and Fisheries. There is a very well-established Reading Room with 120 exchanges of Agricultural Journals and Research Bulletins coming in every month from all over the world.

There is an Information Officer attached to the Library who provides information on all important crops and helps the farmers to get better acquainted with the profession of their choice. There are two part-time agricultural college students who are working in the Library indexing subjects.

Cold Storage Society.—The Forum took initiative in organising a Farmers' Forum Co-operative Cold Storage Society in the State. This Cold Storage Society has been registered under the name "Mysore State Farmers' Forum Co-operative Cold Storage Society Limited, Bangalore", with a share capital of Rs. 10 lakhs. The Government of Mysore has given a loan of Rs. 4 lakhs to the Society. The Society has already started working to achieve its objectives. The Cold Storage will have an initial capacity of 1,200 tons.

Farmers from Friendly Countries.—Contacts are being established between the Farmers of various countries as well as with their farm organizations. For the last two years we are getting groups of American Farmers as our Guests. Three such groups of farmers who came to the State stayed as Forum Guests. Our Farmers also are going abroad every year to study the Farm Organizations and improved methods of Agriculture. Important personalities have paid visits to our State Office. Among them we may mention Dr. Tyler Wood, the Director of Technical Co-operation Mission of United States of America and the First Secretary of Agriculture, the Embassy of West Germany.

Contact with Legislators.—The Forum is having a close contact with all the members of the Legislature of the State of Mysore. Very

often the members of Legislature are being invited to the State Office to attend meetings in connection with the activities of the Forum. The Forum is trying to acquaint the Legislators with all the problems of the farming community of the Mysore State. It is also trying to get resolutions passed to improve the standards of the farmers in Mysore State. Many of the Legislators are active and life-members of the Forum.

The Forum is considering very seriously to have a lobbyist who can act as a liaison between the Legislators and the Forum.

Agricultural Fairs.—The Forum has decided to hold the First State Agricultural Fair in the State by about the end of November 1961. It has got its future plans to arrange Agricultural Fairs in all districts and taluks.

Propaganda Van.—The Forum has recently purchased a Willy's 4-Wheel Drive Station Wagon at a cost of Rs. 24,000 for propaganda. The Forum has got plans to equip the van with projector and films.

Activities of the State Forum.—The Forum,

(1) Organises Seminars.

(2) Conducts Training Camps.

(3) Publishes monthly and quarterly Agricultural Journals both in Kannada and English.

(4) Conducts Field-Days.

(5) Runs Library and Information Centres.

(6) Propagates the objectives of the Forum through films.

(7) Organises of Agricultural Museums.

(8) Sends Circular Letters to District and Taluk Forums on topics relating to Agriculture.

(9) Maintains close contact with all Taluk, District and Central Forums.

(10) Publishes informative technical booklets, pamphlets and leaflets.

(11) Provides information to its members on topics of Agriculture, Animal Husbandry, Horticulture and Fisheries.

(12) Co-ordinates the activities of the different District and Taluk Forums.

Future Programmes of the State Forum are:

(1) To establish Information Centres in all its branches to serve the needs of the farmers better.

(2) To start Farmers' Forum Co-operatives in all districts and taluks.

(3) To instal a Printing Press.

(4) To build a Conference Hall and a Museum wherein all improved varieties of crops grown in Mysore State and Agricultural implements used in the State will be exhibited.

(5) To run Kisan Special Trains for the Farmers to visit important places of agricultural interest all over the country.

(6) To start an Insurance Co-operative to insure Farm Machinery, Crops and Live-stock.

(7) To build a Farmers' Home to accommodate the visiting farmers from within and without the State.

(8) To possess a Mobile Soil Testing Van to go round the State and give service to its members.

(9) To possess a Canning Unit to put up demonstrations in Fruit and Vegetable Canning.

(10) To start Farmers' Forum Model Farms in all the four divisions of the State on plots of 500 acres of land in each place.

(11) To hold training for women in Fruit and Vegetable Canning and Home Management.

(12) To take the responsibility of running Agricultural Schools in the State.

(13) To assist all Panchayat and Taluk Development Committees to plan their agricultural programmes.

(14) To arrange a State Level Training Camp for Block Development Officers, Agricultural Demonstrators and Agricultural Extension Officers and progressive farmers.

(15) To arrange *Kharif* and *Rabi* Campaigns in the State.

New Features in the Amended Constitution of the Forum.— 1. There will be Family Membership besides Ordinary, Active and Life-Memberships. Families who pay an annual fee of Rs. 25 will be enrolled as Family Members. All Members of the Family will be the Members of the Forum. For purpose of this clause a family will be taken as not more than 6 adults and all of them will be treated as Active Members of the Forum.

2. There will be Sympathisers and Patrons who pay Rs. 250 and Rs. 500 respectively.

3. There will be a State Council, which consists of all Members of Divisional Executive Committees and three elected members from each district. This Council will act as the General Body of the Forum hereafter.

4. There will be Divisional Forums in each of the Four Divisions of the State. The Vice-Presidents of the State Samaj will be the Presidents of each Divisional Forum.

5. There will be Village, Hobli or Circle Branches of the Forum in addition to existing District and Taluk Forums.

6. There will be a State Organiser whose duty is to tour the State and organise the Forums and increase the membership and also carry out specific duties entrusted by the State Executive Committee.

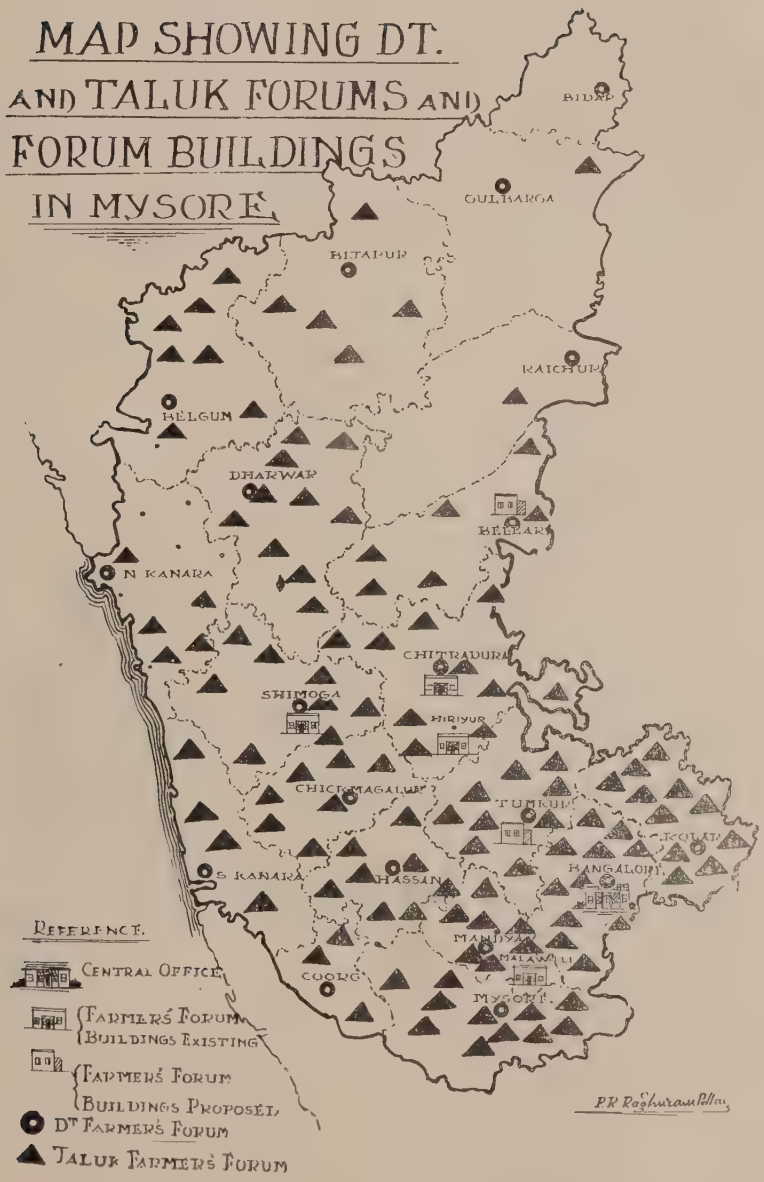
7. There will be a Public Relations Officer whose duty is to study the problems of Farmers and make proper representation to various authorities of Government. He will also help the farmers to get information on Agriculture.

8. The Membership dues will be distributed to all the branches from Village to Centre in a reasonable proportion.

Farmers bear a two-fold responsibility which they recognise instinctively whether or not put into words, as the producers of vital necessities of life. They bear a duty to produce abundantly in order to fulfil human needs and prevent hardships. At the same time farmers bear a responsibility to themselves and to their families to earn a standard of living equivalent to that of any comparable group in our Society. The Forum is helping the farmers to lead a reasonable standard of living.

This Organisation is working on the model of other farm organisations in progressive countries. The Farm Organisations in other countries were able to solve the problems of farmers to a great extent. These Farm Organisations abroad bring to bear upon the Government and Legislature of those countries the opinion of farmers effectively and see that the interests of the farmers are safeguarded. The Mysore State Farmers' Forum is trying its best to build a strong Farmers' Organisation as it is working in other progressive countries.

In this competitive world the slogan is "ORGANISE OR PERISH". Hence the farmers should organise themselves to get their problems solved. "UNITED WE STAND, DIVIDED WE FALL."


MAP SHOWING DT.
AND TALUK FORUMS AND
FORUM BUILDINGS
IN MYSORE
BIDAR
GULBARGA
BIJAPUR
RAICHUR
BELGUM
DHARWAR
BELLARY
N KANARA
CHITRADURG
SHIMOGA
HIRIYUR
CHICKMAGALUR
TUMKUR
KOLAR
BANGALORE
S KANARA
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REFERENCE.
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FARMERS FORUM BUILDINGS EXISTING
FARMERS FORUM BUILDINGS PROPOSED
DT FARMERS FORUM
TALUK FARMERS FORUM
P.R. Raghuram Pillai

Sri. N. RACHIAH, B.A., B.L.
Minister for Agriculture and Social Welfare
President, Mysore Farmers' Forum and Young Farmers' Association, Mysore State

PRESIDENTIAL SPEECH

By N. Rachiah*

Friends,

We have just revised our bye-laws and that, in my opinion, indicates your strong resolve to expand the activities of our Forum. And in the context of this, I am extremely hopeful that a good follow-up programme can be envisaged. I am glad to inform you that our Executive Committee has met several times since our last General Body and if as much as we wished to have done has not been done, still we are able to place on the table a record of our achievements and progress.

Membership.—With a target of 10,000 active members we have practically approached the mark. Early in the year we circularised our district friends that a prize would be given to the person who enrolled the highest number of members in his jurisdiction for the State. We are now in a position to assess the enrolment and bank upon the enthusiasm of our local workers. A second resolution also was passed in this regard, that each of our District Forums should be allotted a sum of Rs. 1,000 as against Rs. 100 we sent them as token grant to hold seminars. A fair target of membership was fixed to qualify the districts to get this amount and a number of districts have drawn the amount. We hope the districts will do better this time and it need not be stressed that on the strength of the districts depends the strength of the State Forum.

Our Journals.—As is known to you all, our Kannada Journal reaches all our members. Attempt has been made to bring it out attractively and the Editorial Body is responsive to the demands from our members. With the increase in the number of members, the journal section is assuming considerable proportions and it is on the programme to keep up the publication side commensurate with the demand.

Library.—As a further addition to our Library Rs. 4,000 worth of books have been ordered. In fact, we have in mind to purchase about 4 to 5 thousand rupees worth of books each year and with the indexing, etc., already started, it is intended to have it as a centre of reference to our members.

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* Minister of Agriculture and Social Welfare in Mysore and President, Mysore Farmers' Forum and Young Farmers' Association, Mysore State. This is his speech at the time of the General Body Meeting of the Mysore Farmers' Forum, May 1961.

It is in view also to organise a museum and project centre and thus increase the utility of the information unit. This is bound up with the question of more room, which we hope will be solved.

Our Co-operatives.—Since a long time the Farmers' Forum as you all know was endeavouring to put up a cold-storage plant at Bangalore on a co-operative basis. Now, I am happy to inform you, that we have succeeded in organising a co-operative cold-storage plant at Bangalore with the generous assistance given by our benign Government. The Government of Mysore have been pleased to give a loan of four lakhs of rupees to the Mysore State Farmers' Forum Co-operative Cold-Storage Society. The work will start very soon. It is our ardent endeavour and fervent hope to organise such Cold-Storage Societies on co-operative basis under the aegies of the District Farmers' Forum, in all the 19 districts.

We have also under our active consideration, plans for having a fleet of refrigerated vans for transport of vegetables, etc., from Bangalore to distant markets like Bombay so that our producers might get better price for their products.

The Bangalore District Forum is a step in advance in having sponsored the District Vegetable Growers' Co-operative Federation and only awaits to be put into a working order.

In my last address I said that we had it on our programme to start Agricultural Producers' Co-operatives at District Levels to establish processing plants, manure mixture plants and distribution of necessary articles to the farmers. The formation of these co-operatives at District and Taluk Levels is necessary and requires being expeditiously pursued.

While on the subject of co-operatives it must also be remembered that the starting of an Insurance Co-operative to insure farm machinery, crops and live-stock is as much necessary. This matter requires further discussion.

Expansion.—I am very strongly of opinion that a substantial portion of the activities of the Forum should move to the proximity of the Agricultural College. It would not only forge a link between the centre of agricultural education with the practical problems of the working farmer, but should be able to canalise agricultural extension along proper channels. The future farmers being trained in the agricultural and veterinary colleges should grow in the knowledge of the Farmers' Organisation, working in the interest of country's agriculture.

Commodity Committees.—At the time of the last General Body Meeting, four commodity groups discussed problems on (1) cereals and

pulses, (2) oil-seeds, (3) fruits and vegetables and (4) milk and live-stock. This method of specific discussion on crops and products has been taken up by our regional bodies also. Holding of commodity Committee Meetings and recording the resolutions is on the programme of the Farmers' Forum, India, and a few of our members have participated in these meetings.

I must mention here that for taking stock of members' opinions and ideas in this manner and work out the courses of action two Sub-Committees were formed: (1) the Standing Committee and (2) the Planning Committee. The deliberations of these Committees so far made have been noted. In my address to the last meeting, I said that the cost of cultivation of crops is an important programme and along with other ways and means of gathering these figures, it would be useful if our members themselves kept accounts. They would be able to gauge just what it cost to produce certain commodities and whether the prices they were offered were commensurate or not. The farm accounts book envisaged is now printed and arrangements must be made for at least a few of our farmers to keep these accounts systematically.

All-India Farmers' Convention.—The Farmers' Forum, India, followed up its scheme of Exhibitions, by holding the First National Agricultural Fair at Calcutta. During the period of the Exhibition, the Forum arranged the National Convention of Farmers also. Several of our members attended the Convention.

During the year under report a group of 17 American farmers visited us and though their stay was short, the programme of living with our farmers' families and observation of our local agriculture was carried through. The farmers were also organisers of Agriculturists' Associations in their country and their stay over here was a pleasant experience. We must thank our farmers also who played hosts. Not the less interesting was the visit of the Japanese Youth Group, and the Secretary of the European Catholic Youth Organisation.

Four of our friends Sri. Mukund, Sri. Pooviah, Sri. Mallesh Gowda and Sri. Deshmukh visited Europe under the Youth Delegation and Sri. Muniswamy similarly visited Japan. So we have kept up our exchange and contact programme.

It has been a great pleasure for us to arrange for our M.L.A. and M.L.C. friends to visit our Forum premises. This needs no mention in fact, but to state that we arranged a few programmes, for, these friends are of ourselves and we demand their sympathies and services for our association. The last time they visited was on the National Farmers' Day when we honoured some practical farmers for having raised record crops of paddy, jola and ragi in the *Khariff* Campaign.

Van.—In pursuance of the various resolutions made from time to time a van has now been purchased for the Forum. This should enable the organisers to move out to districts and see that the organisation is knit closer in the interest of programmes.

I believe that these few points make it clear that the Forum has been considerably active. It is true all the same that a few projected programmes could not be taken up, as for example, building of Farmers' Home, and Running of Kisan Trains. More things have been discussed at the formal and informal meetings of the Forum, such as having an All-State Agricultural Fair, taking up of lands and sponsoring demonstration farms and agricultural schools in districts and organising of training camps. We will keep these things in mind and I am pretty sure that with the kind co-operation of you all, the Forum will be able to show progress in many directions.

I wish now to permit myself of a little diversion from our business speech. This, I think, is quite necessary in order to understand where we stand in relation to our Constitution and what our responsibilities are and what our expectations should be, as agricultural workers. It is a very sad, but nevertheless, a true fact that the agricultural labourer gets the lowest wage in our country. This is all the more paradoxical, because, it is he who produces the wealth of the nation by his hard work; and it is he that is the real backbone of the country. Without agricultural labour, where could you get food and the raw material for industry from? It is a pity that such producers of foodgrain often groan under heavy debt, starvation and mostly malnutrition, while those of his counterparts in industry get better wages and amenities.

All over the world, labour is held in high esteem. Strangely enough, in our country, labour, particularly manual labour, is the least respected. Dignity of labour remains yet a slogan mostly. Idleness has been tolerated by society and in fact those that thrive without manual labour are respected and sometimes even encouraged. The principle of "equal wage for equal work" for men and women as embodied in Art. 39 (*d*) of the Constitution is not practised. Let alone equal wages; there is not even an assured minimum or even continuous wage for the farm labour. An Industrial worker or a Class IV servant has so many amenities such as medical aid, provident fund, insurance, bonus, dearness allowance, housing and other incentives with assured continuity of employment or compensation for loss or injury. He is also assured of the minimum hours of work; additional remuneration is given for overtime work. What is the fate of farm labour? They work for hours on end, day in and day out, but yet get not even a living wage. It is unfortunate that there is no improvement in the situation in spite of Art. 23 of the Constitution prohibiting traffic in

human beings and forced labour in some form or the other. Thanks to the great awakening fostered by our great leaders, the days of exploitation and tyranny, social injustice and economic inequality are beginning to fade out.

Article 43 of the Constitution lays down that:

"the State shall endeavour to secure, by suitable legislation or economic organisation or in any other way, to all workers, *Agricultural*, industrial or otherwise, work, a *living wage*, conditions of work ensuring a decent standard of life and full enjoyment of leisure and social and cultural opportunities, and, in particular, the State shall endeavour to promote cottage industries on an individual or co-operative basis in rural areas."

Now, you will see that every one of our agricultural workers has a constitutional right to have work and a living wage and all other amenities even as other workers have. The State is expected to ensure them all this. But how can the State do it by itself? What is the State after all? It is your representatives working for and on behalf of you. If you want them to do a thing, they are bound to do. Just enable them to do it, by asserting your rights and by discharging your responsibilities. If a demand is made on co-operative basis, it will surely be fulfilled. In fact, Government have a number of schemes on co-operative basis. It is now our turn, as a well-knit organisation, representing agricultural interests as we do, to approach them and ask what we want.

There is a Minimum Wages Act for agricultural labour of several categories. But its implementation has not been so effective as we wish. Because of administrative difficulties, there is slackness. These difficulties have been brought to the notice of Government and I am sure, in the near future action will be taken for the full and effective enforcement of the Act.

We are all out for modernisation of agriculture. The advantages of science and technology have got to be shown to the worker on the field. Therefore, there should be, in my opinion, permanent Exhibition buildings at all District Levels and if possible at the Taluk Levels also. At these buildings exhibition of mere models, charts, graphs, photos and the like would not impress the rural farmers so much as real, live ones. Therefore, these exhibitions should be converted into actual demonstration plots and live-stock farms with live animals and live plants as we see in the exhibitions of some of the advanced countries. It is then, that our farmers would be able readily to differentiate between our outmoded techniques and latest scientific and technological achievements and take to those that are most advantageous to them. It is the display of live animals and plants and the manner in which they are

evolved, reared, maintained and availed of that catches his imagination and not mere replicas and representations. This aspect needs our attention and serious consideration. That means, we must have our own permanent exhibitions at as many levels as possible.

In the matter of distribution of iron, fertilisers, seeds and farm implements, complaints have come to notice of Government that stocks are released out of season, that they are not distributed equitably according to the needs of the farmers or that they get somehow into the hands of hoarders, profiteers and smugglers. There may or may not be any truth in it. But such a complaint could be set at rest if the organisation of farmers themselves like the Farmers' Forum takes up the work. As you are aware, the co-operatives now entrusted with the distribution of these materials are manned and managed by non-agriculturist, non-official members. I believe the position both as regards supply and distribution would improve during the III Plan period and it would only be in the fitness of things that the Farmers' Forum takes up this responsibility.

My impression, after a deep study of our agrarian problems is that the agricultural labour has not so much glamour for ownership of land as for security of employment and living wage. What they really want is a living wage, continuity of employment throughout the year and such other amenities as are given to other labouring classes and service personnel of the lowest category. This is quite a just claim in view of the constitutional safeguards and the vital activity they are engaged in. But how to ensure it is the question of questions. There is the question of mere ownership of land without adequate profit either to the owner or employment to the farm labour. Those that own large extents of land are interested in mere ownership and not the maximum benefit from such ownership. Such landlords usually have many avocations and agriculture is only secondary for them. They get small portions of land cultivated only to get the year's supply of foodgrains and other staple commodities for their families and leave large extents of land barren. This fallow land is useful neither to himself nor to the starving agricultural labour. These wage-starved farm labourers clamour for work. The landlord turns a deaf ear or exploits the helplessness of the labour for the best benefit. On the one hand farm labour is denied work and on the other arable land is kept fallow. This is real injustice to ownership and the dependent agricultural labour, and, in a manner of speaking, subversive of the great many well-intentioned governmental schemes in the matter of increased food production. Here, therefore, is a question which could be solved only by a method of co-operative farming with mutual goodwill and reciprocative accommodation and profit. That is why co-operative farming is so much

in the news now-a-days and judged by the results achieved by some of the advanced countries, this appears to be a panacea for the present for us. Agriculture, to be profitable, should be rearranged and made an agricultural industry. Then large extents and small extents together could give farm labour sufficient, continuous work through the operation of co-operative farming. Each large extent of single holding or a holding of small pieces of land brought under the co-operative farming method could have, subject to availability of facilities, pasture land, live-stock farm, poultry farm, dairy farm, vegetable and fruit gardens and orchards and fisheries. While absorbing farm labour, these diversified activities provide further employment potential through their subsidiary industries such as processing, canning, communication and the like.

Of late, there has been a trend of thinking among some intellectuals. It is this: if a man is given some acres of land and asked to cultivate it individually, it is rather difficult for him to find the wherewithal to commence agricultural operations. Even if commenced, there is no assured supply of water; there is the question of preparing the land by investing on manure, fertiliser, repeated ploughing, good seed, farm implements and supplementary labour at peak seasons, which all mean money; cheap credit facilities are not readily available and hence, he has to fall a victim to usurious money-lender of the village. This lands him in a vicious circle which never ends happily. The yields from lands are after all precarious depending upon the caprices of nature. How could a poor man venture in this hostile atmosphere? Instead, suppose the large extents of land are turned into composite farms and the labour is paid on the turnover of work. Would it not satisfy the labour and give adequate returns? Then, the question is, who should manage such farms? Government or private sector is the answer. Now consider if such a proposition would not fit in with your activities and whether it would not benefit you to brace up yourselves for such a responsibility. This is apart from co-operative farming.

In short, I want the Farmers' Forum to be one of the most reliable agencies in the private sector to undertake and execute all the developmental activities envisaged in the III Five-Year Plan, through an intensified programme of co-operative farming, service co-operatives, credit co-operative research centres and above all the infusion of confidence into farm labour that the Farmers' Forum can deliver the goods and rise up to any occasion in the solution of the food problem and the procurement of economic and social justice to the toiling agricultural masses who are our real wealth and whose prosperity is the prosperity of the Nation.

PANCHAYATS AND RURAL DEVELOPMENT

By N. Rachiah*

In consonance with the declared policy of Government, all the States in the country have created local autonomous bodies with full powers and responsibilities to cater to the needs of the people in the respective areas. As a result, Panchayats have now become statutory bodies and the members and office-bearers of the Taluk Boards are directly elected from the people and hold office actually for and on behalf of the people. And during the last week of December 1960, our beloved President formally ushered in the Panchayat Raj in Mysore. Since then, a new life and vigour symptomatic of an awakened people, I am happy to say, is clearly visible among the people in the State, particularly at the village levels, through the numerous Village Panchayats, Community Development and National Extension Service Blocks.

The Mysore pattern of Panchayat Raj is not very different from what has been adopted by other States. The Panchayati Raj Organisation in Mysore, as in other States, consists of a three-tier system of local administration with the Panchayat at the base, covering all villages with a population of 1,500 or over. At the Taluk Level we have the Taluk Development Board which corresponds to the Panchayati Samithi in other States and at the District Level, we have the District Development Council co-ordinating and supervising the functions of the Taluk Development Boards. The District Development Councils correspond to the Zilla Parishads established in other States.

We have grouped the 25,880 villages in the State into 7,444 Panchayats. Of these, 132 larger Panchayats are constituted as Town Panchayats. All these have elected their own Chairmen and Vice-Chairmen and are functioning. The State has also 171 Taluk Boards at Taluk Level and 19 District Development Councils at the District Level.

The elementary civic needs of the people in villages such as, adequate drinking water-supply, proper approach roads to the villages, drainage, sanitation, facilities for education, medical care, etc., are the prime concern of the Panchayats. Drinking water is something one tends to take for granted. But in many parts of the country, rural, urban and far-flung tribal areas, the water that is available is unfit for drinking. Often, where drinking water is not unhealthy, there is not

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enough of it. Every village in the State should have this very elementary necessity of life. Water like air, light and earth is the free gift of God and I feel that it is the birth-right of every human being to be able to use this, to the extent to which he needs for his sustenance. The State has a programme which aims at providing drinking water facilities to all the villages in the State by renovating the existing drinking water wells and constructing additional wells. It has also a programme of rural sanitation which envisages the starting of health centres, construction of rural latrines, and paving of village lanes, etc. Under the Community Development Programme, since its inception in the State in 1952, numerous drinking water wells have been dug, a number of wells have been repaired or renovated, rural latrines and drains constructed, village lanes paved and primary health centres started. But these have only touched the fringe of the problem. There is yet a lot more to be done, both in the agricultural and industrial spheres.

The objective of C.D. and N.E.S. is to assist each village in planning and carrying out an integrated, multiphased family and village plan directed towards increasing agriculture production; improving existing village crafts and industries and organising new ones; providing minimum essential health services and improving health practices; providing required educational facilities for children and an adult education programme; providing recreational facilities and programmes, improving housing and family living conditions; and, providing programmes for village women and youth, according to the "Guide to Community Development". Creating the social climate and the attitudes which will produce a new village outlook and motivate the village people to want to improve the way they live and their traditional practices and methods of making a living must be the business of all people, both official and non-official, who are concerned with the Community Development and National Extension Programmes. This involves a human approach and a humane consideration of the social, economic and educational environments of the rural life.

Education on a universal and compulsory basis, particularly in respect of the children of the weaker sections and working classes and welfare of women and children as a general measure, must have State's priority attention, in all developmental activities of our State.

Agriculture and Industry.—Agriculture has to meet the increased demand for food, raw materials and supply of labour which arise from the growth of industry and the progress of urbanisation associated with it. At the same time, agriculture must meet the challenge of population growth and of demands for improved nutrition. Industry in its turn provides the means of raising the productivity of agriculture and of transforming it from a traditional way of life into a commercial

and industrial activity, demanding complex skill and technique. Industry provides large opportunities for employment and attracts to it more and more rural workers enabling those who remain behind in the agricultural field to raise their levels of productivity by adopting modern methods of agriculture, assuring larger returns of income. At the same time, if agriculture as a profession is not maintained profitably and agricultural labour is not kept content, there is the danger of acute dearth for agriculture labour to carry on even the existing agricultural operations. Agriculture and industry play a vital role in the national economy. This has been realised long back by our planners. During the past decade of planning, covered by the First and Second Plans, greater progress was recorded than in any previous decade. Agricultural production expanded by 35 per cent. and the output of foodgrains was raised by about 20 million tons in the country. Industrial production was 51 per cent. higher by the end of 1959. In the Third Five-Year Plan, it is proposed not only to maintain but also intensify the tempo of progress so far achieved with regard to the production of food crops and other commodities. It is planned to increase food production in the State by 7·50 lakh tons, during the Third Plan period, so that the total food production at the end of the Third Plan would be of the order of about 48·5 tons. Even this will be slightly short of our food requirements at the rate of 16 oz. per head based on the assumption that the population would be 25 million by then. There are several schemes for development commercial crops like cotton, sugarcane, cashew, cocoanut, arecanut, cardamom, etc., in various parts of the State under Third Plan periods. Side by side with improving the agricultural production in the villages, attention has to be bestowed by the Panchayat to produce more and more fruits and vegetables also. Panchayats should see that the production is increased not only to meet the entire needs of the villages concerned but also to export to the neighbouring areas where the products are in short supply. Each village or group of villages should specialise in the production of such grains and other products as it is capable of, on account of their special local and other conditions so that each village may be in a position to maintain a good volume of trade with the neighbouring villages and other parts of the State. Panchayats should put forth their best efforts and exploit the potentialities of the villages to the maximum extent possible.

Cottage industries in rural areas should be started in large numbers because, they afford subsidiary employment to agricultural labour. There is vast scope for organising cottage industries such as weaving, manufacture of kamblis, mat-weaving, shoe-making, bee-keeping, basket-making, carpentry, production of small agricultural implements, etc., in our rural parts. The selection of industry in each village must

depend on the availability of raw materials, skilled personnel, need for the industry and also marketing and other facilities. The Development Department of Government is always ready to afford the necessary technical advice to Panchayats in starting any cottage industry.

The State Government have set apart substantial funds for the planned development of village and small industries and have established a network of Boards such as the Small-Scale Industries Board, the Khadi and Village Industries Commission, the Coir Board, etc., for this purpose.

Under the Community Development Programme during 1959–60, an amount of Rs. 7·78 lakhs was given as loans to about 1,749 loanees and an amount of Rs. 2·23 lakhs was granted as subsidy to 1,628 grantees. Over 1,500 rural artisans were given basic training and over 500 artisans were given refresher training at the Demonstration-*cum*-Training Centres during the three years ending 1959–60. I do not want to bother you with statistics. Suffice it to say that during the past few years many village industries have been started, but there is need to start yet more industries in the numerous villages in the State. It is expected that as a result of the revival of the handloom industry envisaged under the Third Plan, 18,000 weavers would come under the co-operative fold, 30 housing colonies would be built and 950 worksheds would be put up. A provision of Rs. 359·27 lakhs has been made for this. A sum of Rs. 85 lakhs has been provided for the development of handicrafts including wood-carving and ivory inlay. In order to increase production and income from industries and also to train the people in the villages in habits of self-help and in the latest commercial and business methods, a sum of Rs. 85·50 lakhs has been provided under Rural Industrialisation Scheme during the Third Plan period. So far as Panchayats are concerned, they can raise their own financial resources, as under the Act, they are vested with adequate powers of taxation for raising sufficient revenues within the village itself. If, however, their financial resources are found inadequate, they always can depend upon Government to augment their resources. The Panchayats need not be afraid of taxing the resources of the people to the maximum extent possible as they should realise that taxation is not an end in itself but only a means to an end. The people should be made to know that the taxes collected from them would be utilised for affording them greater amenities of life and help raise the standard of life of the people. Panchayats are expected to harness the willing and active co-operation of the people.

The policy of Government has been to encourage co-operation as a people's movement and to leave the entire responsibility and initiative for social and economic development to the village co-operatives

along with the Village Panchayats. The Panchayats through the co-operative societies should aim at an integrated approach to the credit needs of the farmers. Villagers should be encouraged to start different types of co-operative societies including multi-purpose societies.

The Rehabilitation of Rural Economy depends, to a large extent, on cattle development. Working bullocks help in agricultural production and milch cattle help in improving the pattern of food consumption. Several schemes are being implemented for improving the quality and quantity of live-stock production by remedying existing deficiencies like poor and defective breeding, prevalence of diseases and the absence of a profitable market for live-stock products. The *per capita* daily consumption of milk is at present 4·76 ounces while in a balanced diet, it should be 10 ounces. The Third Plan aims at raising the intake of milk at least to 8 ounces. Side by side with improving the quality and quantity of the cattle wealth the Village Panchayats can profitably take steps to step up poultry rearing, not only to supplement agricultural income but also to add to the food output. The present annual *per capita* consumption of four eggs in the State is proposed to be raised to fifteen by stepping up the production of eggs to 33 crores by the end of the Third Plan. This can be achieved only by increasing the population of hens by 50 per cent. as well as by improving the indigenous breed and increasing their laying capacity.

Another way in which the Village Panchayats can improve the economic condition of the working classes is by developing inland fisheries wherever the facilities for starting them exist. Under the Third Five-Year Plan, it is proposed to establish an inland fisheries research station in the State. But Village Panchayats need not await the establishment of this Research Station in starting inland fisheries wherever facilities for this exist. The Director of Fisheries in the State will always be prepared to render Village Panchayats all possible assistance including technical know-how in the matter, if he is only approached.

I have briefly stated the method by which Village Panchayats can help in improving the economic condition of the people, by adopting improved methods of agriculture, animal husbandry, horticulture and inland fisheries and also by starting village and small-scale industries. If the members of the Village Panchayats have a receptive attitude towards modern methods, and if they approach the problem in a spirit of adventure and service, it would be possible for them not only to banish the spectre of poverty that prevails in the State, but to make miraculous progress in various spheres of economic growth.

THE FARMER'S PLACE IN SOCIETY

By M. P. Patil*

That all art follows the plough furrow was a great truth realised by our ancestors in India. Civilisation started with the basic occupations of Agriculture and Animal Husbandry. Even Kings and Seers living in forests took to breeding of live-stock. The farmers had a high place in Society. A Maharashtra saying has it that of all the occupations the best is Farming, trade is a little lower and the worst is to be a servant. But now things have turned otherwise and farming is low in the scale.

It is not without reason that the society of old placed farming high. Agriculture is responsible for a clean half of our national income: Seventy out of hundred of our population are in Agriculture. Owing to an excess of population and want of application of technique to farming our Food position has gone very bad. We are on a starvation ration and to our great sorrow we have to depend on supplies from outside countries. The Ford Foundation team has proved it by figures that at this rate the line of impossibility in feeding all this population in spite of imports will be reached by 1965–66. All this emphasises the need to pay immediate attention to the improvement of Agriculture and the Government and the Planning Commission have rightly given an important place to Agriculture.

Any occupation requires sufficient capital and those who follow the occupation most realise a reasonable income from it. The farmer in our country suffers from many ills including want of capital, want of sufficient land, and want of food that is so essential for keeping up ones' health. It is to be greatly admired that he still clings with devotion to his occupation.

Many material considerations like supply of seeds, manures, implements and credit have been provided for in the Plans, but there seems to be a lack of appreciation of the person of the farmer.

As an exception may be mentioned the institution of the crop competition scheme. Here the initiative of the farmer is tackled. Prizes are awarded to farmers who grow the highest yields of different crops per unit of land and these prizes are awarded at the Taluk, District and

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State levels. While the scheme is well thought of, the officials responsible for conducting the competitions do not appear to have entered into their spirit. That is why the scheme has not been publicised sufficiently. Recently the Farmers' Forum arranged for the distribution of prizes for the State Level Kharif Crop Competition on the National Farmers' Day. It was a significant event and all the members of the State Legislature were invited for the function. But the number of these Legislators who attended the function was disappointing. And it was not to be expected that the representatives of the farmers themselves would so keep back from an occasion got up to honour the Front-rank Farmers. In other countries the heroes of the Farmers' occupation are honoured as much as other heroes; nor do newspapers there deny them the privilege of front-page news. Our papers here who show so much consideration to pictures and fashions may very well try to show up such essential items as those that pertain to the important citizens of the country, the growers of Food for people.

Competitions and prizes are intended in the last analysis to encourage the farmers in general to put in more effort and from this point of view it seems worthwhile to hold the prize distribution and similar meetings in the villages.

If the farmers are to earn a place in society, their standards should improve. But if the farmers are waiting for others to improve them they are really under an illusion. Government may help them. But they cannot by themselves blame their fate and continue lazy. They must become their own architects. Many deficiencies may be rectified by coming together in an organization. And the sooner the farmers who are apt to be silent recognise this, the better it will be for them. They should wake up and work for having a direct voice in the affairs pertaining to them.

MAXIMISING FOOD PRODUCTION THROUGH PROPER ALLOCATION OF RESOURCES—MYSORE RESEARCH

By N. P. Patil*

Need for Farm Management Research.—Today farmers live in a dynamic world. Technological developments which took place during the last fifty years have surpassed all the changes and economic progress made during the previous fifty centuries or so. Consequently farming systems in many regions of the world are out-of-date and there are serious maladjustments in the organisation and operation of majority of farms in various areas. To determine the changes or adjustments needed, farm management investigations are undertaken and new plans are proposed to eliminate such maladjustments and to improve farm productivity and profitability.

Evidence gathered in recent years indicate that farming in economically underdeveloped countries is not entirely subsistent. They do have surplus products for sale and raise money crops for exchange both in the internal and international markets. They are thus intimately affected by the changes in prices received and paid and by the technological and marketing developments. Today farmers face the competition not only of their neighbours but also the farmers in every part of the world. To meet this challenge, new knowledge and better techniques must be constantly made available to farmers. It is with this end in view farm management investigations are undertaken in India and is particularly so in the Mysore State.

Brief History of Farm Management Research in India.—Farm Management Research is new in India. A series of investigations into the economics of farm management were initiated and co-ordinated by the Directorate of Economics and Statistics, Ministry of Food and Agriculture, Government of India. They were sponsored and financed by the Research Programmes Committee of the Planning Commission. This has been the most comprehensive enquiry in which attempts were made to evolve farm management research and analysis that suit the needs of the country. The enquiry was primarily designed to provide information on the input and output relationships in farms which will be useful for studies of the relative efficiency of various factor combinations in the regions under study. The first series of enquiries were carried out in six States in the years 1954–55 to 1956–57.

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Encouraged by the success of the first series of investigations a second series of investigations were started in four States not covered by the previous ones. These investigations have been carried out in Andhra, Bihar, Orissa and Mysore, in one selected district in each State. The methods and procedures for the enquiry adopted in this series are more or less the same as those in the first series except that the current investigations are based on the cost accounting method only. Moreover, the second series explicitly includes in its objective collection and analysis of data with a view to find their applicability for farm planning. These investigations will be carried out for a period of three years.

Though the investigation is based on cost accounting method, the approach of Mysore Centre is entirely different from the rest of the series. Its approach is one of problem-solving and of helping the farmers in increasing their productivity and income. It is designed towards solving the food problem of the country by specifically working on the economics of water use. Water in India is a scarce factor and it is even so in the Mysore State where it forms only about three per cent. of the cropped area. Even this scarce water is extravagantly used on crops like paddy and sugarcane which are heavy consumers of water. It is observed that farmers are using water in such high doses which results in diminishing the yield per unit of water applied. The Farm Management Research in Mysore is thus designed to investigate this fact and to explore the possibility of using water most judiciously on those crops like ragi, potato, cabbage and other vegetable crops which are not heavy consumers of water.

There is very great scope for increasing the production of food in India with the existing resources simply by recombining these resources in new ways or reallocating these resources differently among existing uses. Thus the objective aimed at is to seek out new ways of allocating resources which will have the result of increasing the total food production. The Mysore Centre, therefore, focuses squarely on ascertaining the potential increases in aggregate food production which could be made possible by reallocating water from its present use into more efficient uses.

Some Results of Research.—The research work is in operation for over two years. A report based on the data collected during the first year is being finalised. Tentative results of analysis of a few enterprises are available. The results indicate that yields of irrigated ragi (2,000 lb.) average from two to three times that of unirrigated ragi (800 lb.) even though the total amount of water used was slightly higher on irrigated ragi (water requirement of unirrigated ragi is 17 acre-inches and that of irrigated ragi is 18·51 acre-inches on an average),

Similar results are available for potato and cabbage crops. The results show that with slightly higher quantity of water (21 acre-inches of water) yield obtained was about 7,000 lb. of potato. Similarly with the application of 13·64 acre-inches of water the yield of cabbage was 17,124 lb. per acre. Paddy with approximately the same production (1,700 lb.) as that of irrigated ragi, requires about 60 acre-inches of water which is nearly three times the water required for irrigated ragi. Thus the productivity per unit of water (acre-inch) is about 110 lb. of ragi valued at Rs. 20, 330 lb. of potato valued at Rs. 45, 1,180 lb. of cabbage valued at Rs. 94 and 30 lb. of paddy valued at Rs. 5. The productivity of water on paddy is minimum. The results show that it is possible to use water on a more extensive area than used at present by switching over wherever possible and practicable to more productive crops like cabbage, potato and irrigated ragi. This will result in appreciable increase in food production and income.

Considering the two food crops (cereals), paddy and ragi, the results are indicative of the fact that the productivity of water can be increased three-fold in physical terms and four-fold in terms of money simply by reallocating the use of water.

Practical Utility of Research.—Research work does not end with the discovery of new facts and knowledge. The results of research should be made available to extension workers and shown to the farmers in the region: and its value and utility is recognised. Farm Management Research provides useful information to extension workers and farmers. They are effective tools in the hands of an educator. They are immensely useful in farm planning. The findings of Farm Management Research in Mysore go a long way in stepping up food production and if adopted, wherever possible, will revolutionise the food production technique in the State. The sole purpose of this article is to bring home to the extension workers and farmers in the State, the validity, practical utility and applicability of the Farm Management Research conducted in the Mysore State.

PLANT PROTECTION IN MYSORE STATE

By M. Puttarudriah[1] and D. V. Murthy[2]

I. Introduction

That pests and diseases could nullify all improvements effected in agricultural production by other means like improved seeds, irrigation, fertilisers, improved implements, etc., needs no special emphasis. All the same its importance has come to be realised only of late in this country, which can be attributed to two factors. Firstly, after the cessation of last war and especially after partition, food production in the country received a set-back. It was found that food production was not able to keep pace with the ever-increasing population and of the production, nearly 10 per cent., was being lost on account of crop pests and diseases in storage. Secondly, the development of D.D.T. and other synthetic insecticides gave a tremendous fillip to the efficacious and economical methods of control of crop pests and diseases and opened a new vista in the field of chemical method of plant protection. Today the term 'Plant Protection' has almost become synonymous with chemical methods of control of Plant pests and diseases.

With reorganisation of States in 1956, Mysore State has emerged as a unit with a rich agricultural potential in the country. It is almost sufficient in the matter of total food production which consists of jowar, rice, ragi and minor millets. Commercial crops like coffee, cardamom, arecanut, coconut, cashewnut, sugarcane are also grown on an extensive scale. With the varied climate, soils and crop pattern, the problem of crop pest control in the State is also varied and complex.

II. Role of Agricultural Department in Plant Protection

It is but natural that the State Agricultural Department is vitally interested in plant protection as an aid in increased agricultural production. The beginning of plant protection work in the State may be said to have begun with the appointment of late Dr. L. C. Coleman as Entomologist and Mycologist in 1906. Ever since then, the Divisions of Entomology and Mycology of the State Department of Agriculture have been devoting their attention to the investigation of biology and

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control of insect pests and diseases of crops in the State. As a result thereof, a number of extension recommendations have been given out: spraying Bordeaux Mixture against fruit-fall of Arecanut caused by *Phytophthora arecæ* (*Koleroga*); mechanical method of control against red-headed hairy caterpillar (*Amsacta albistriga*); cultural method like earthing up and biological method like release of the parasite *Trichogramma minutum* against sugarcane borer (*Chilotræa infuscatella*) are some of the earliest works that deserve mention and which have withstood the test of time.

With the increasing importance of plant protection, a special unit was created in 1948 with one Plant Protection Assistant and two Fieldmen in each district. As a result of States' reorganisation, the staff pattern of Plant Protection Staff is however not the same in all districts and the present staff pattern is as follows:

Headquarters

Government Entomologist and *Ex-officio* Plant Protection Officer, Seshadri Road, Bangalore–1 (Phone No. 3202 extension) assisted by Senior Assistant Entomologist (Plant Protection), Department of Agriculture, Seshadri Road, Bangalore–1.

Divisional and District Staff

(*a*) *Bangalore Division.*—Plant Protection Assistants, Bangalore, Tumkur, Kolar, Mandya and Chitradurga, C/o the respective District Agricultural Officers.

(*b*) *Mysore Division.*—Plant Protection Assistants, Mysore, Hassan, Shimoga, Coorg and Chickmagalur, C/o the respective District Agricultural Officers.

(*c*) *Raichur Division.*—(i) Plant Protection Assistant, C/o District Agricultural Officer, Gulbarga, to look after Gulbarga, Bidar and Raichur Districts (exclusive of Gangawati area). (ii) Plant Protection Assistant, C/o District Agricultural Officer, Bellary District and Gangawati area of Raichur District and (iii) Plant Protection Assistant (Oilseeds), C/o the District Agricultural Officer, Bellary, to look after crop protection work of oil-seed crops in the area.

(*d*) *Dharwar Division.*—(i) Crop Protection Assistant, C/o the Deputy Director of Agriculture, Dharwar, to look after plant protection work in Dharwar, Belgaum, Bijapur and N. Kanara Districts and (ii) Plant Protection Assistant (Oilseeds), C/o the District Agricultural Officer, Bijapur, to look after crop protection work of oilseed crops in the area.

III. Functions of Plant Protection Staff

The farmers who are in need of advice in their plant protection problems may approach the respective Plant Protection Assistant in their area who will (*a*) help in the identification of pest/disease, (*b*) advise suitable measures of control and (*c*) assist in hiring of plant protection equipment if available for a small fee and also technically help in spraying and dusting operations.

The Government Entomologist/Plant Protection Officer at Headquarters who is the Technical Officer of Plant Protection Assistants will

(*a*) help in identification of pest/disease;

(*b*) render technical advice regarding control measures to be adopted;

(*c*) conduct laboratory and field trials of pesticides and equipment and render guidance in selection of suitable pesticides, sprayers and dusters, etc;

(*d*) arrange for periodical training of Plant Protection Staff and others; and

(*e*) assist in preparation and execution of large-scale pest control campaigns.

Recently, a post of Plant Pathologist (Extension) has been created, who will look after the extension side of plant disease control in the State and other activities such as *Koleroga* campaign, licensing of tobacco nurseries, checking of potato wart disease, etc. His headquarter is also at the Directorate of Agriculture, Seshadri Road, Bangalore–1.

IV. Other Facilities and Concessions available to Farmers under Plant Protection

1. Pesticides required for plant protection work are not readily available to farmers in time of need and often exhorbitant prices are paid for the same. To remedy this situation, the Department of Agriculture purchases pesticides, stock and sell them to farmers under 'No loss-No profit' basis. On an average pesticides worth Rs. 2½ lakhs per annum are sold to farmers on this account. Farmers are requested therefore to approach the local agricultural authorities or the District Agricultural Officer whenever they want to purchase crop protection pesticides.

2. A token amount is also annually set apart for purchase of pesticides for free distribution (as demonstrations) in case of large-scale outbreak of pests and diseases. The funds, however, are very limited,

3. Under a scheme jointly financed by the Indian Central Oilseeds Committee and the State Government, a subsidy of 50 per cent. may be given to cultivators for purchase of pesticides for use in oilseed crops in certain specific areas of the State. The funds under this head are limited and further details may be had from the Oilseeds Development Officer, Department of Agriculture, Gadag, Dharwar District.

4. Under a scheme jointly financed by the Indian Central Arecanut Committee and the State Government, small-scale areca growers in certain areas of the State will be able to obtain fungicides required for *Koleroga* work at subsidised rates (75 per cent. of the supply price *plus* margin of profit for the society which sells them). The funds under this head are also very limited and further details can be had from the District Agricultural Officers, Shimoga and Chickmagalur.

5. Under the *Kharif* Campaign Scheme, free seed treatment facilities with organo-mercurials or sulphur are available. Annually, an amount of Rs. 50,000 is set apart for this purpose. Details can be had from the District Agricultural Officers.

6. Under the Grow More Food scheme, cultivators of food crops can get hand-operated sprayers and dusters at 50 per cent. cost, the other 50 per cent. being borne equally by the State Government and the Government of India. This scheme is very popular. Details of various hand-operated sprayers and dusters that are available under this head can be had from the District Agricultural Officers. Not all makes of hand sprayers and dusters are eligible for subsidised sales but only those selected and approved by the State Stores Purchase Committee and purchased through the Department of Agriculture.

7. To popularise aerial spraying the State Government may consider proposals towards meeting 50 per cent. of the cost of aerial spraying operations in case the cultivators come forward through Taluk Development Boards, Panchayats, etc., to meet the other 50 per cent. cost.

8. To supplement the resources of the State at times of need, the Government of India have established a Central Plant Protection Station at Dharwar, which is at present located at Dr. Adke's Bungalow, Saptapur, Dharwar. Both power and hand-operated plant protection machinery are available for hire generally at a rate of Rs. 2–50 per day for the former and 0–25 nP. for the latter. Pesticides will also be available for sale at cost price. Further details can be had from the Officer-in-charge of the above station.

V. Some Important Points Worth Remembering in Plant Protection Work

(*a*) Plant protection is most essential in order to get the best out of improved seeds, irrigation, fertilisers, etc.

(*b*) Early detection and identification of pest/disease is necessary to undertake effective and economical measures of control.

(*c*) Plant protection, like sowing, fertilising and harvesting, should be the sole responsibility of the farmer himself. He should not look to others for protecting his crops.

(*d*) Combined efforts of all farmers in any given area yields best results in plant protection, for pests and diseases are no respecters of individuals or groups.

(*e*) The Department of Agriculture renders help to the farmers in plant protection work by identifying pests/diseases and suggesting remedial and control measures, hiring out of equipment to needy cultivators, arranging for supply of pesticides and hand-operated sprayers and dusters. These facilities may conveniently be taken advantage of by the farmers.

In case of need, farmers may solicit the advice and assistance of the District or Divisional Plant Protection Staff by writing to the concerned District Agricultural Officer. They may also write to the Government Entomologist and Plant Protection Officer, Department of Agriculture, Seshadri Road, Bangalore–1, for all general plant protection problems like choosing of a pesticide or equipment and those particular problems pertaining to insects, mites, rodents, birds and other animal pests. As regards identification and control of plant diseases, they may write to the Plant Pathologist (Extension) at the above address.

MODERN TRENDS IN THE USE OF FERTILISERS

By N. G. Perur*

Fertiliser industry is growing fast all over the world. Improved techniques are used in the manufacture of fertilisers of high purity and analysis. To facilitate storage and handling under all weather conditions, fertilisers are granulated, coated and packed in moisture-free bags. Wastes and by-products of various industries are also processed for use as fertilisers.

Soil types differ in their response to fertiliser applications. Requirements of crops for various plant food nutrient elements are also not same. Experiments are therefore conducted all over the world in order to assess the fertiliser requirements of various crops under different climatic and soil conditions. Experiments are also conducted to find out suitable doses, efficient methods and proper time of applying fertilisers. During the last decade or so, use of radioactive elements has helped in understanding many of the intricacies of the fate of applied fertiliser elements in soil.

All the hitherto mentioned efforts in the fertiliser science are towards one goal—to get more yield per acre at minimum cost. In order to acquaint our farmers with the modern trends in the use of fertilisers, the following aspects are discussed.

More Concentrated Fertilisers.—For many years sodium nitrate and single superphosphate were the chief sources of nitrogen and phosphorus respectively, as inorganic artificials. Originally these products had only 16·0 per cent. nitrogen and 12·0 per cent. P_2O_5 respectively. Now there is considerable improvement in the methods of manufacturing and marketing of fertilisers. An array of fertilisers are now seen in the market to suit the specific requirements of crops, soil and climate. Nitrogen in fertilisers is increased from 16 per cent. N in sodium nitrate and 20 per cent. N in sulphate of ammonia to 33 per cent. N in ammonium nitrate, to 45 per cent. N in urea and to 82 per cent. N in anhydrous ammonia. Originally single superphosphate contained 13 per cent. P_2O_5; this is now raised to 20 per cent. and a new product—triple superphosphate—has 48 per cent. P_2O_5. In potassic fertilisers also, increase is found from 24 per cent. to 62 per cent. K_2O.

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There are definite advantages in promoting the use of fertilisers having high purity and analysis. Considering the unit value, concentrated fertilisers cost less. In addition, economies are realised in packing, handling and transportation. It costs just the same to transport one ton of sodium nitrate as it costs to transport one ton of urea. But one ton of urea contains almost three times the nitrogen present in sodium nitrate. Even on the farm, it is more economic to use concentrated fertilisers. It cuts storage space and time and labour for applying to field. However all these added conveniences make it obligatory on the part of the farmers to understand more about such fertilisers. The farmers should know well how to store, when to apply, how to apply and how much and how frequently they should be used for different crops.

Different Forms of Fertilisers.—Till last 20–30 years only few fertilisers were used on farms. Nitrogen was applied either as sodium nitrate or as ammonium sulphate. Soluble phosphorus was used mainly as single superphosphate. Now the situation is entirely different. Experiments have revealed that all soil types and all crops do not respond equally to the same fertiliser. Some crops prefer nitrogen in nitrate form and other may prefer nitrogen in the form of ammonium ion, or the same crop may be requiring both nitrate and ammonium ions but at different stages of its growth.

Nitrogen is likely to be leached away from the soil. On the other hand ammonium ion is held by the soil colloid complex and is changed to nitrate which can subsequently be utilised by crop during its growth period. In order to have both the advantages, ammonium sulphate—nitrate and ammonium nitrate—are used. Nitrate in these fertilisers, being immediately available, is helpful in establishing the crop in its early stage. But nitrogen in the ammonium form is released in course of time. Thus a continuous supply of nitrogen is assured at all the critical stages of crop development, by using fertilisers, containing different forms of nitrogen. Other compounds of nitrogen, like urea form and urotropin, undergo nitrification more slowly than the ammonium salts. These compounds are being tried where delayed availability of nitrogen is desired.

Some soils are notorious for locking up (making unavailable) the soluble phosphatic fertilisers. To overcome such a situation other forms of phosphates like dicalcium phosphate, basic slag, bone-meal and rock phosphate are used with advantage. These phosphatic compounds although insoluble in pure water, are made appreciably soluble in soil water charged with carbon dioxide and other organic acids.

Another effective method of using the soluble phosphatic fertiliser is to apply as supercompost, or fertilising the green manure crop to be

ploughed in before a desired crop is taken. Supercompost is a compost to which superphosphate is added during its preparation.

Two common potassic fertilisers are muriate of potash and sulphate of potash. Muriate of potash is potassium chloride. Cumulative effect of chlorides in soil may prove toxic to certain crops. Sulphate of potash is therefore always preferred. Especially in tobacco leaves, since chlorides adversely affect the burning quality, only sulphate of potash is recommended.

Compound Fertilisers.—The common fertilisers like ammonium sulphate, superphosphate, muriate of potash, etc., are all simple fertilisers. They contain just one plant food nutrient element either nitrogen or phosphorus or potash. Until recently these fertilisers were applied to soil either singly or mixed with one another in proper proportion to supply the desired levels of N, P and K nutrients. However recently, fertilisers containing more than one nutrient element, called compound fertilisers, are being manufactured. Since these contain more than one fertiliser element, use of such fertilisers simplifies the compounding of fertiliser mixtures.

Soil tests have not indicated in many Indian soils the need for potassium application. Similarly, in many soils phosphorus application has also not shown sufficient response. However, it is imminent that the effect of larger application of nitrogen fertilisers will create an unbalanced condition in respect of nutrient elements and very soon potassium and phosphorus will be found limiting. The use of compound fertilisers, however, may obviate such a contingency.

Micronutrient deficiencies are reported in certain patches of land used for orchard plants. Of late, hormones and weed-killers are also being used on farms and horticultural gardens. Micronutrients and hormones are to be applied only in very small doses. The new compound fertilisers contain in addition to the usual N-P-K elements, the micronutrients, plant hormones, weed-killers, insecticides and fungicides. These extra additives in the compound fertilisers will serve greater convenience in farm operations. While retaining the full agronomic value of the additives, the farmer will be able to apply to this soil a variety of elements and regulators in one operation.

Soil Testing.—Fertiliser recommendations should be on the basis of the soil test results. Although the soil test does not furnish precisely all the information a farmer desires to know about his soil, it helps in identifying abnormalities, if any, in his soil. Whether soil is acidic or alkaline, or whether it contains excess salts can be identified by the soil test. Unless acidity or alkalinity is corrected and excess salts are removed out of the soil, no matter how much fertiliser one applies to

field, crop yield will continue to be low. Soil testing also indicates broadly the general fertility status of soil.

All States in India have one or more soil testing laboratories. Farmers can now get their soils tested and get the fertiliser recommendations free. In many cases fertiliser recommendations based on soil test have not only resulted in higher yields but also economised fertiliser use.

Placement of Fertiliser.—With the use of concentrated fertilisers it is all the more important to use the correct method of placement of fertilisers. Disastrous effects may accrue as a result of improper fertiliser placement. Especially in case of phosphatic fertilisers proper placement has definite advantages.

There are several methods of placement: simple broadcasting, drilling with seeds in the row placement, band placement, applying with irrigation water, foliar application, etc. Out of all these methods, band placement is the best. It has many advantages. Band placement is safe and efficient. Safe, because the fertiliser is placed 1–2 inches below and 2–3 inches on the side of seeds. It ensures uniform germination and growth of plants. The method is efficient because the fertiliser is placed just at the root zone. It also saves time, labour and cost. The fertiliser can be placed on one or both the sides of seeds and plants. Localised placement is one of the efficient methods, especially in the case of phosphatic fertilisers. However, special type of fertiliser drill is necessary for band placement.

Another convenient method is, applying fertiliser in the form of pellets. One or two pellets are pushed down into the soil at the side of transplanted plants.

Foliar application means applying fertilisers on leaves. This is done by dissolving fertiliser in water and spraying the solution on crop. This method claims mainly two advantages: economy of fertilisers and freedom from the fear of fixation in soil .Experiments with the foliar application of urea fertiliser on wheat crop have shown promising results. Foliar application of micronutrients in the form of spray is used for correcting deficiency symptoms on some of the fruit trees.

It is mentioned earlier that ammonia is a very rich source of nitrogen (82 per cent. N). However, at present, special equipments and precautions to be taken in its application have restricted the use of ammonia only to large farms.

Soil Organic Matter.—Lastly, when using fertilisers one should not neglect the soil organic matter. With the more and more use of

fertilisers, soil organic matter is depleted at rapid rate. Physical, chemical and biological properties of soil are all governed to a great extent by the soil organic matter. In order to maintain the inherent fertility status of soil, it is imperative to keep constant the level of soil organic matter. This is achieved by liberal use of bulky organic manures such as F.Y.M., compost and green manure.

THE FIRST MYSORE FARMERS' FORUM CO-OPERATIVE COLD STORAGE SOCIETY

By M. V. Rajasekharan*

Refrigeration of fruits and vegetables can be traced perhaps to more than half a century. During this time ordinary dry storage has become popular and effective.

The advent of refrigeration made it practical to use small cold storage equipments. These are highly convenient and profitable to the farmers throughout the world.

Today especially in foreign countries much attention has been paid to cold storage installation in all towns and cities. Latest refrigeration methods are used and highly perishable products are preserved in peak flavour and texture as long as possible. There are several cold storage plants operating throughout the country here in India also. Particularly one can see a number of cold storage plants in the Punjab.

A cold storage plant offers facilities for bulk storage of fruits, vegetables, meat, fish and other items of food and meat products. With the development of cold storage facilities, farmers are likely to develop more interest in this kind of storage for their produces.

The question of installing a cold storage plant of considerable dimension under Mysore Farmers' Forum has been engaging the attention of the members since the beginnig of 1959. The Mysore Farmers' Forum in its meeting which was held on 15th July 1959 decided to instal a cold storage plant as a co-operative society.

The Cold Storage Society was registered under the name of the "Mysore State Farmers' Forum Co-operative Cold Storage Society Limited, Bangalore," with a share capital of Rs. 10 lakhs. A Board of Directors has been nominated by the Government of Mysore for the first three years as per bye-laws. The Board hopes to complete the construction of putting the plant by the end of December 1961.

The Mysore State Farmers' Forum Co-operative Cold Storage Plant will have an initial capacity of 1,200 tons with plans for future extension. It provides storage facilities for potatoes, fruits and vegetables, meat, fish and other food and meat products.

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* Sri. M. V. Rajasekharan, Hon. Secretary, Mysore Farmers' Forum.

The objectives of the Mysore State Farmers' Forum Co-operative Cold Storage Society Limited, Bangalore, are as follows:—

(1) To establish a cold storage plant for the development of marketing of processing of perishable agricultural produce such as fruits, vegetables, flowers and livestock produce such as eggs, fish, meat, milk and milk products by preserving them in cold storage plant and for that purpose to purchase land, to construct buildings or to take buildings on hire, to purchase and instal plant and machinery and other essential equipments.

(2) To provide storage facilities for the preservation of perishable agricultural and live-stock and their by-products.

(3) To provide finance to the members against the pledge or hypothecation of perishable agricultural and live-stock produce and their by-products.

(4) To arrange for the marketing and processing of perishable agricultural and live-stock produce and their by-products.

(5) To encourage thrift, self-help and mutual aid amongst the members.

(6) To undertake such other activities as are most conductive to the efficient working of the cold storage plant and for welfare of agriculturists in the area of operation of the society with the approval of the Registrar of Co-operative Societies.

The authorised capital of Rs. 10 lakhs has been divided into 10,000 shares of Rs. 100 each.

The Government of Mysore has been pleased to sanction Rs. 4 lakhs as a loan to the above Society to implement its plans as early as possible.

I am sure, the individual farmers, the District and Taluk Co-operative Societies, which are marketing potatoes, vegetables, fruits, fish, meat food and meat products will generously subscribe towards the share capital and take the benefits of Cold Sotrage Society service.

The Mysore Farmers' Forum has got plans to put up cold storage plants in each district headquarters to provide storage facilities to farmers. It is also hoping to possess a fleet of refrigerated vans to transfer fruits and vegetables to distant markets of Bombay and Madras.

DIRECTORS OF THE MYSORE FARMERS' FORUM COLD STORAGE CO-OPERATIVE SOCIETY, LTD.

Sriyuths:

1. K. V. Byregowda, M.L.A. (*Chairman*)
2. N. Hutchumasti Gowda, M.L.A.
3. L. T. Karle
4. V. Masiyappa
5. M. V. Rajasekharan
6. Royangowda Patil
7. Kollur Mallappa, M.L.A.
8. T. A. Pai
9. K. M. Deviah, M.L.A.
10. Y. Ramakrishna, M.L.A.
11. N. K. Aiyangar
12. President of the Bangalore District Co-operative Bank
13. Registrar of Co-operative Societies in Mysore or his nominee
14. Director of Agriculture in Mysore or his nominee
15. Director of Government Gardens in Mysore or his nominee

ROLE OF AGRICULTURE IN COMMUNITY DEVELOPMENT

By H. C. Linga Reddy*

In the First 5-Year Plan emphasis had been placed on agriculture in unequivocal terms. Seemingly substantial results had also been achieved. Naturally, the Second Plan was launched with a sense of relaxation. But, soon it became apparent that the progress achieved earlier in farm production was neither adequate, nor could agriculture be assigned a place of secondary importance. As a result, early in the Second Plan period the agricultural targets were reviewed and efforts to achieve them were intensified. In the Third Plan, however, due prominence is given to agriculture from the very beginning.

Agriculture is of Fundamental Importance

It has been stated in the draft Third 5-Year Plan that at the present stage of development production of sufficient food-grains has the highest urgency. Further, it has been stated that in the scheme of development the first priority necessarily belongs to agriculture. The importance of achieving self-sufficiency in food-grains and meeting the requirements of industry and exports is one of the major aims of the Third Plan. The agricultural production has to be increased to the highest level feasible, so that the incomes and levels of living of the population may raise and keep pace with incomes in other sectors. The level of agricultural production is an important determinant of the rate of growth of the economy as a whole. Thus it has been fully recognised that in the process of fostering a self-generating economic growth in the country, agriculture is the starting point and it forms the bedrock on which the industrial and commercial developments are securely founded.

N.E.S. the Agency

In areas where Community Development Programme is in operation, the development work perused by the Government is carried on by the N.E.S. While there may be exceptions as in the case of Public Works, Public Health and Education Departments, agriculture was one of the spheres of activity which was transferred very early to the N.E.S. In the first stage, the task of working with villages in matters relating to farming was entrusted to this agency. Later on, the personnel, funds and efforts were co-ordinated at the Block level. Presently, the entire

line of organisation, at and below the level of the Taluk, has been completely integrated with the N.E.S. set-up. As such, the responsibility of achieving agricultural improvement in the State squarely rests with the N.E.S., at the Taluk level, while the Department shares the responsibility of providing the supplies, trained man-power and other resources needed. This point has significant implications.

As has been explained in the draft Third Plan, "the basic problem in rebuilding the rural economy is the organisation of the agricultural efforts at the village level. In the measure in which progress is achieved in mobilising the village community for increasing production every other problem of the rural population becomes easy of solution. The growth of agriculture production is of such critical importance that the principal test for the community development movement at the present juncture must be its practical effectiveness as an agricultural extension agency. It is, therefore, incumbent on the Community Development Organisation to take all steps necessary to eliminate its deficiencies in this respect and to accept responsibility for achieving the targets of agricultural production on the basis of the widest possible participation by local communities". There is very little ambiguity in the above statement.

In the Context of Panchayat Raj

The Community Development Programme since its inception, in 1952, has undergone marked changes in content, form and emphasis. In the earlier years, it started as a programme sponsered and implemented by the Government in which the people and their leaders were required to participate. But over the years, as a result of a growth in the Programme, it has emerged as a programme of the people in which Governmental agencies are required to participate and assist. This change has considerable significance in the terms of the following responsibilities:—

(1) In the present set-up, it is the people who have the privilege and responsibility to identify the problems faced by them and to fix the priority in which these problems are to be solved.

(2) It is the people who should find adequate resources, internal as well as external, in order to meet the situation in solving these problems.

(3) It is the people who should take decisions as to the plan of action, allocation of functions, objectives to be attained, etc.

(4) It is the people who should actually put into practice the decisions taken, with or without the help of the governmental and other external agencies.

(5) It is the people again who should take responsibility for not only putting the plans into action but also for the success or even the failure that may arise therefrom.

Thus, it is the people and their representatives that will be at the helm of affairs in the system of Panchayat Raj. Therefore, in so far as agriculture is concerned, the success or failure in accomplishing the task that is set for the Programme of the Community Development will also be as much the responsibility of the local organisations at different levels as it is that of the Government and the concerned Department. However, this is not merely a question of sharing the responsibility. It is something more than this. It involves the valuable principle that no real prosperity in the village could be built up without making the improvement in the standard of farming that is in vogue.

How to Develop Agriculture

When briefly analysed, the agricultural development will be the responsibility of five important agencies at different levels—Farmer, Village Panchayat, Taluk Development Board, District Development Council and the State Government.

(1) *Farmer*

He is the primary agency in so far as agriculture as it is pursued in the country today is concerned. Farming is solely a private and family enterprise. The vital decisions with regard to farming, whether it is the use of improved seed or land improvement, or plant protection, are always taken by the farmer who is the head of the family. Of course, his decisions are often influenced by the attitudes and opinions of the members of the family as well as the intimate groups of neighbours and friends with which he is associated. All the same any improvement in agriculture could be brought about at the village level only by influencing and educating this farmer. The ways in which such improvement could be brought about may be broadly divided as follows:—

(*a*) *Educational.*—Items of improvement in farming which are unknown to cultivators are to be brought to their notice through discussions, demonstrations, study tours, film shows, exhibitions, etc. This work is normally termed as "Extension".

(*b*) *Promotional.*—There are certain items of improvement in farming of which the farmer is already aware, but which he cannot put into practice either because he is not fully convinced of their efficacy, or because he does not have the resources required for the purpose. Here, an agency which is interested in promoting agriculture should ensure the incentive, encouragement, and resources required in this respect.

(*c*) *Supplies and Service.*—Any educational programme will necessarily create a greater demand for supplies and services. This could be explained by the illustration that when farmers become aware of certain improved seeds then there is always a greater demand for that variety. Again, as people begin to use more and more plant protection equipment, they would need technical assistance in the upkeep, repair and replacement of this equipment. Therefore, any organisation interested in promoting agriculture should also ensure adequate, timely and cheap services and supplies to the cultivators.

(2) *Village Panchayat*

The next important agency which is concerned with agricultural development is the Panchayat at the village level. Since agriculture is not a community affair, there are only a few spheres of common interest in farming, as a whole in which the Village Panchayat can take active part. This may be broadly classified as follows:—

(*a*) *Educational Work.*—In each village a group of agricultural leaders, in and outside the Panchayat, can take interest in the problems of agriculture encountered by the village, and in respect of which educational work is necessary to be perused. They can, in consultation with the Gramsevaks and other Extension Officers, develop a programme of educational work as related to agriculture. This will include the demonstrations, study tours, field-days, etc.

(*b*) *Promotional Work.*—To give agriculture a respectable place and also to generate sufficient community interest and enthusiasm, the Village Panchayat can organise competitions, exhibitions, campaign shows, etc., on important days of festival in the village. They can honour and reward the winners in these contests as well as the best farmers of the year in the village.

(*c*) *Supplies and Services.*—There are certain supplies and services required in farming and which cannot be procured or maintained by the individual farmers. An illustration of this sort would be power sprayers, portable pump-sets, tractors, etc. The Panchayat can, with advantage, buy and maintain such equipment and provide other similar services to the cultivators in order to promote agricultural development in the village.

(*d*) *Community Agricultural Works.*—The Panchayat can also organise the Community in respect of works like de-silting of tanks, repairs of irrigation canals, raising the village plantations, improving common gomals, undertaking large-scale plant protection work, organsation of young farmers' clubs, etc.

(3) *Taluk Development Board*

It has been an accepted policy in the Community Development Programme that the Block should be the Unit of planning and development. Now that the Taluk Board will be the body to guide the work in the Block, it should recognise the full implication of this policy and function in such a manner as to ensure this. That means to say that the Taluk Board should be seized of the problem of developing agriculture in the Block as a whole. Towards this end, the Board may develop a second line of agricultural improvement programme which would reinforce the programme undertaken by the several Village Panchayats in addition to pursuing those items of agricultural work which are common to a number of Panchayats. Thus the Taluk Boards will have the programmes related to:—

(*a*) Educational work,

(*b*) Promotional work,

(*c*) Supplies and Services,

(*d*) Items of agricultural work common to more than one Panchayat.

(4) *District Development Council*

As it is this is a body mostly concerned with planning and co-ordination. However, at this level also the items of work outlined above in respect of T.D.B.s may be followed.

(5) *State Government*

At the State level the agricultural development work in respect of research, education and extension would be pursued as usual.

The Task of Village Panchayat

The Village Panchayat in order to foster the agricultural development in its respective area, as stated above, could attend to the following:

(i) Formation of a Sub-Committee dealing with agricultural and related items of work. This Committee may consist of both the members of the Village Panchayat and other prominent agricultural leaders who may be co-opted to serve on the Committee.

(ii) This Committee might provide the leadership required in identifying the important agricultural problems as well as the possible areas of improvement and give a positive direction to agricultural development in the village. The Committee can also attend to the work concerned with organisation and co-ordination of efforts within the village as also of the agencies outside the village.

(iii) A "Village Agricultural Development Programme" may be drawn up by this Committee, which, with the consent of the Village Panchayat and the Village Community as a whole, would become the basis for agricultural work in the village.

In this country where agriculture is the sustaining occupation for a predominent proportion of the population and also the sheet anchor of the national economy, improved farming is of critical importance and the Village Panchayats are the vital institutions who could and should pull their entire weight in the desired direction.

THE MYSORE STATE YOUNG FARMERS' ASSOCIATION

THE Mysore State Young Farmers' Association is a twin organization along with the Mysore Farmers' Forum. It looks to the sponsoring of Young Farmers' Clubs and carrying on of the youth movement.

A club is a group of certain number of boys and girls whose programmes are guided by a leader. The club organization lays special stress on rural youth and agricultural projects. The objective is to develop the youth to become progressive farmers in the future, to teach them how to join a Forum and discuss their plans and problems and give them incentive to display their progress and achievements.

Each boy or girl member is allotted a work, may be bee-keeping, poultry rearing, pig raising, taking care of cattle and sheep, kitchen gardening, and any other assisgnment connected with farm work and home-making. Projects are according to their nature—individual projects or group projects.

In line with this basic work the other programmes like getting parents to co-operate in putting their children to club work, to secure the co-ordination of schools and other institutions in organizing and running the clubs, to train leaders, to hold rallys and achievement days, to improvise rewards and incentives to boys and girls who stand up to a competition in the progress of their work, collecting sufficient funds, and doing all other things to reach the objective come into play. International, inter-State and inter-District exchange of young farmers has been among the programmes for a considerable time, and the Association has the advantage in this respect of securing a world contact in the interest of better human understanding in general and progressive agriculture in particular.

The Council of Mysore Young Farmers' Association with headquarters at Bangalore and its district and taluk councils formed all over the State looks to the carrying out of the programmes. More than 400 youth clubs contacting nearly 30,000 youth of the country form the strength of the Association at present. A club affiliates to the Association on an annual payment of Rs. 5 and the Association is getting a matching grant from the State Government at present.

Editorial

AGRICULTURAL RESEARCH AND EXTENSION WORK

It is often complained that results of Agricultural Research do not reach promptly the doors of the Farmers, with the result that no more appreciable progress has been registered on the farm-front than what it was or used to be before. It becomes necessary to investigate if it is so and the reasons thereof.

Agricultural Research is primarily carried out in the State Agricultural Laboratories, Research and Field Stations, etc. Before the results are sent out as recommendations for adoption by the farmers, testing on farmers' own fields are also carried out. Thereafter it is the job of the Extension worker to pass on the recommendations to the farmers.

Perhaps one reason for the delay in passing on the results of research is the inadequate staff on the Extension side. At present each Extension worker has to cater to the needs of more farmers than what he could handle normally.

Even in cases where the research recommendations are passed on to farmers, it is sometimes found that only a small percentage of farmers accept and adopt them on their fields. This is perhaps because the farmer may not be in a position to adopt them due to inadequacy of finance and other resources. Not only the results of research have to be evaluated in terms of farmers' needs and resources but arrangements will have also to be made to provide necessary credit and other facilities.

Research Articles

EFFECTIVE YIELDING ABILITY OF A-300 AN IMPROVED SAFFLOWER (*CARTHEMUS TINCTORIUS*) VARIETY FOR DHARWAR DISTRICT

By B. H. Katarki[1]

Introduction

Chavan *et al.* (1956) have reported a high yielding safflower (*Carthemus tinctorius* L.) variety A-300 for Dharwar District. Subsequent comparative trials conducted at Research Station from 1955–56 to 1957–58 have confirmed the superiority of A-300 over local in respect of yield by 14 per cent. (Table I).

Under a certain set of environmental conditions the seed yields of a safflower variety depend on factors like number of capitola per plant, number of seeds per capitolum and 100 seed weight. The high yields of A-300 over local may be either due to any one of these factors individually or due to the combined effect of all these factors together. It was observed from the available data that both the varieties possess same number of capitola per plant while the seed content of capitola of A-300 seems slightly higher. During the previous studies the number of seeds in the epical capitolum of plant was taken to represent the average seed-bearing capacity of the capitola of a particular variety. Though higher seed-weight has contributed in past for increased yields, these records do not justify the higher yielding ability of A-300 variety. With a view to assess the effective yielding ability of A-300 variety, the following studies were undertaken.

Material and Methods

A-300 variety was under comparison with local variety of safflower in replicated rendomised blocks in 1958–59 with gross plot of $25' \times 8'$ and having spacing of $2' \times 1'$. The trial was sown on 15–10–1958.

Several qualitative characters were observed and recorded on random twenty plants in respect of each variety.

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[1] Plant Breeder and Officer-in-Charge, Agricultural Research Station, Bijapur.

Experimental Results

The mean records of thirteen quantitative characters on twenty random plants of A-300 variety in comparison with these local varieties have been furnished in Table I.

Table I

S. No.	Item	A-300	Local
1	Height of plant in cm.	65·7	69·7
2	Spread of plant in cm.	51·3	46·5
3	Number of branches per plant	8·4	9·9
4	Position of first effective branch	25·6	25·0
5	Number of days required from sowing 1·11 to blooming of capitola borne on top branch ..	76·7	79·1
6	Number of days required from sowing to blooming of capitola borne on middle branch	79·0	81·9
7	Number of days required from sowing to blooming of capitola borne on first branch ..	85·3	87·6
8	Blooming duration of a capitola	4·0	3·4
9	Number of days required from sowing to maturity	95·4	96·7
10	Number of capitola per plant	30·3	29·9
11	Number of seeds per capitola borne on top branch	28·4	30·8
12	Number of seeds per capitola borne on fifth branch	28·3	24·3
13	Number of seeds per capitola borne on first branch	23·0	21·5
14	100 seed weight in growth	5·38	4·82
15	Per acre yield in lb.	632	579
16	Percentage increase in yield over local ..	9·15	..

Discussion of the Results

Yield in safflower is subject to large environmental fluctuations and the performance of an individual plant is not a reliable index of its genotype. It is a known fact that optimum agro-climatic complex

required of a plant for its full expression of its inherent capacity for growth and production cannot be attained in nature. However, the seed yield of safflower plant under a certain set of environmental complex may be considered as directly dependent on three main factors, *viz.*, the number of capitola per plant, the number of seeds per capitolum and 100 seed weight. Number of capitola per plant, in turn, is dependent on the capacity of a plant to produce effective branching system. Height and spread of a plant indirectly support the efficient feeding system for the capitolar development.

The observations recorded on plant height, spread and number of effective branches (Table I) indicate that A-300 variety is not so tall, but bushy as compared to local variety. Local variety, though having the capacity to produce more branches, possess nearly same number of capitola per plant, thus indicating the effective (apicular) holding capacity of A-300 with its fewer branches.

Observations on blooming in these varieties indicate that the capitola of A-300 bloom earlier than local and the wave of blooming

STATEMENT I

Statement showing yield and other agronomic characters of A-300 varieties local (1955–56 *to* 1957–58)

Sl. No.	Varieties	Seasons	No. of days to flower	Grain yield per acre in lb.	No. of capsules per plant	No. of grains per topmost × central capsule	100 gr.wt. in gm.
1	2	3	4	5	6	7	8
1	A-300	1955–56	82	648	13·6	22·75	5·75
		1956–57	82	304	9·0	24·70	5·13
		1957–58	88	1567	41·4	26·90	6·10
		Average	84	839	21·3	24·78	5·66
2	Local	1955–56	88	571	18·2	25·60	5·70
		1956–57	88	264	11·5	26·40	4·29
		1957–58	97	1324	35·8	29·00	5·26
		Average	91	719	21·8	27·00	5·08

gradually runs downward from the apical end of the plant. The blooming duration of a capitolum is nearly 4 days, *i.e.*, 96 hours in case of A-300 while it is 3 days, *i.e.*, 82 hours in case of local.

It appears that 15–20 days are required for full development of seed from the date of fertilization, capitolar load per plant in both the varieties is nearly same.

The study on seed-holding capacity of capitola situated at different positions with reference to main axis of the plant indicates a very interesting phenomenon. The capitolum borne on the top branch contains the maximum number of seeds while the seed-holding capacity of capitolum gradually reduces downwards along the main axis of the plant in both the varieties. But, the rate of decrease in seed-holding capacity of a capsule of A-300 variety is much less as compared to that of local variety, thus indicating that effective yielding ability of A-300 over local.

The 100 seed weight of A-300 is higher to that of local thus contributing its share to increased per acre seed yields of A-300 variety.

Summary

1. Attempts have been made to assess the factors responsible for the effective yielding ability of A-300, the present standard safflower variety of Dharwar District.

2. Variety A-300 is less tall and bushy in habit of growth having an effective branching system as compared to local variety.

3. The wave of blooming starts from the apical end of the plant and runs downwards in both the varieties while the blooming period in A-300 is comparatively more than that of local.

4. Though the capitolum load per plant is nearly equal in both the varieties, the seed-bearing capacity of capitolum at different vertical positions of the plant varies considerably in both the varieties.

5. Though the seed-bearing capacity of capitolum declines with the downward position of the capitolum from the apical point of the plant in both the varieties, the rate of such decline in A-300 variety is much less as compared to that of local variety.

6. 100 seed weight of A-300 is slightly higher as compared to that of local variety.

7. Thus the factors like the effective branching system, the average efficient seed-bearing capacity of capitolum and the heavier seeds as

assessed by the 100 seed weight seem to be responsible for the effective yielding ability of A-300 variety of safflower.

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Thanks are due to Shri A. G. Shaikh, Counter, for the help rendered in recording various observations.

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BLACK-ARM DISEASE OF COTTON IN KARNATAK

II. Varietal Resistance to Black-arm

By S. R. Kaiwar[1] and S. B. Allayyanavarmath[2]

Introduction

Dharwar American cotton tract of Bombay-Karnatak is the only tract in old Bombay State (at present in Mysore State), where American cotton is grown successfully under rainfed conditions. *Laxmi* a hybrid cotton (G 1 × Co 2) was released for cultivation in the year 1950. On account of its superior performance, it has, within a very short time, become extremely popular amongst both the traders and the cultivators. Not only this variety has covered the entire " Dharwar American Zone " but also has made inroads in Kumta tract. Besides it has spread to adjoining districts like Chitaldrug, Bellary and Raichur in Mysore State, and also in the Kurnool and Cuddapah Districts of Andhra State.

It is observed that *Laxmi* cotton is highly susceptible to Black-arm. Since seed treatment is of little use, the breeders are concentrating their attention on evolving a variety resistant to Black-arm, with all the desirable qualities of *Laxmi.*

Material and Methods

(i) *Method of Artificial Infection*

(*a*) A permanent plot has been selected in which no rotation is followed. The infected plant parts, which fall in the field, will help to bring the disease during the ensuing season.

(*b*) The Black-arm-infected material is finely powdered, mixed with sand and then drilled in the field one week before sowing.

(*c*) The seeds are dipped in the decoction prepared by soaking the infected leaves in water for 2 hours and then dibbled.

(*d*) Four to five sprayings of Black-arm inoculum is given to the standing crop.

(ii) *Preparation of Inoculum and Spraying*

Pure cultures of Black-arm is inoculated in 250 c.c. of peptone dextrose broth in Erlenmeyer flasks of 1,000 c.c., and good growth is

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obtained after 8–10 days. The culture from each flask is mixed in 2 gallons of water and with the help of a bucket sprayer the mixed solution is sprayed to all parts of the plant, especially to the underside of the leaves. Two sprayings are given before the crop attains 3 months and during the next 2 months, another 2 sprayings are repeated.

(iii) *Grading*

Immediately after the crop receives 2 sprayings the initial grading for the intensity of Black-arm starts. The final grading is done sometime in January, after the crop receives 4 sprayings. The system of grading has been slightly modified over the one described by Kaiwar *et al.* (1955) (Appendix).

Experience at Dharwar has shown that there is close relation between the leaf and the stem infection, the latter, in most cases, being the extension of the former through the petiole. In the present system of grading the intensity of the disease was assessed by type of lesions on the leaf rather than the number of leaves or parts of the plant, *i.e.*, petiole, stem and boll affected. This is in accordance with Knight (1938) except for this difference that he had adopted " 13 " grades " 0 " being immune and 12 being fully susceptible. Our grading also resembles the system of grading adopted by Simpson and Weindling (1946) and Kulkarni and Patel (1951) except for the " immune " class which is lacking in their classification. For the sake of easy scoring, the grading system adopted at Dharwar is most convenient and quick and 20,000 plants can be easily graded, both for red leaf blight and Black-arm, during the season within the short time at one's disposal.

As a matter of convenience and to speed up the work every alternate plant in each type is graded. But in case of crosses, *i.e.*, F_1s, F_2s, F_3s, F_4s and B_1s, B_2s and B_3s, all plants in each cross are graded. As we are grading only 50 per cent. of the population in the types and varieties by adopting the grading on alternate plants, the reaction of the ungraded plants are assessed by counting the number of plants affected at monthly intervals and the percentage of attack on a type is worked out. At the time of final selection of a type this percentage is compared with the actual grades obtained by grading in alternate plants and the intensity of the disease is thus assessed and the promising type having high average resistance is carried forward.

A good number of varieties were already under test from 1952–53 season and considerable amount of resistance was noticed in some of the interspecifics and exotics, *viz.*, 2196-4 BK, B.C. 134 C.W.-3-1-7, 170 Co 2, 125 Co 2-18, XAB 5, and 2196, etc. In order to make rapid progress 41 crosses were effected involving quality parents like

Laxmi, Co 4-B 40, MoCo × Co 4, Ys × Co 4 on one hand and resistant parents like 170 Co 2, 125 Co 2-18, Jinja and XAB 5 on the other hand and between the resistant parents themselves, in 1952–53 season only. The object of including a good number of quality parents such as (1) *Laxmi*, (2) Co 4-B 40, (3) MoCo × Co 4 and *Jahagirdar* was to evolve a black-arm resistant quality cotton for (1) Dharwar-American tract, (2) Irrigated Arbhavi tract, (3) Perennial cotton respectively.

The F_1s from these crosses were raised during 1953–54 season in duplicate plots; sprayed and graded as usual. Some of the F_1s were backcrossed to *Laxmi*, Co 4-B 40 and XAB-5 in the same season. All the crosses were carried to F_2 generation and were tested along with the B_1s during 1954–55 season. About 10 crosses in F_2 showed high promise. Some of the F_2s were outcrossed to *Laxmi* as well and the B_1s were further backcrossed to *Laxmi* and Co 4-B 40 to induce quality in 1954–55 season only. A good number of immune plants were selected from the 10 F_2s (and also from others) and were tested in F_3 during 1955–56 season. The B_2s from the first backcross to *Laxmi* and Co 4-B 40 and the B_1s of the second backcross of these parents, the C_1s were also tested during this season (1955–56).

An attempt is not made to interpret the data, on the genetical basis of Black-arm inheritance, as the mass crossing was adopted and no clear-cut ratio was obtained in the subsequent generations.

Experimental Results

The following varieties were sprayed with Black-arm inoculum and classed as susceptibles during 1953–54 season:—

(*a*) *Surat Exotics.*—(1) Express, (2) Stoneville, (3) 289 F, (4) 4 F, (5) Ferguson, (6) 134 CW, (7) 1821-1-BX, (8) 0603 E 4, (9) 7682-BX, (10) 0484-A-1.

(*b*) *Poona Exotics.*—(11) H.A. 11, (12) G 1 × Co. 2-9-3, (13) 1821-1-1, (14) Stoneville-20 (Washington).

(*c*) *Dharwar Egyptians.*—(15) Giza-7, (16) Giza-12, (17) Sea Island, (18) Ashmouni-Gadag, (19) T. Karnak, (20) T. Minoffi, (21) Ashmouni-Dastur, (22) Amoun, (23) V 135.

(*d*) *Dharwar Exotics.*—(24) Sea-land, (25) Jinja, (26) Kampala, (27) D.P.L., (28) Co 4-B 40, (29) Co 4 Gadag, (30) Co 4-B 40-21, (31) Co 2, (32) 0811, (33) 4463, (34) 0744-12, (35) 9030, (36) 7682, (37) 9766, (38) 4411, (39) *Laxmi.*

(*e*) *Dharwar Interspecifics.*—(40) 170 Co 2, (41) 134 CW, (42) 134 Co 2-CW, (43) 134 F_2 CW, (44) 134 Co 2 M Kadayo, (45) UA 8/48, (46) M-4-4, (47) Indore-1, (48) P.A. 289 F, (49) L.S.S., (50) Sind

Sudhar, (51) Hyderabad-American, (52) Perso-American, (53) P.A. 4 F-98, (54) MU-1.

(*f*) *Dharwar Perennials.*—(55) Y.S., (56) about 17 progenies from Co 2×Y.S. cross, (57) (Co.2×Y.S.)×Y.S. F_3, (58) (Co 2×Y.S.)×Y.S. F_3, (59) MoCo×Co 4 F_3, (60) Y.S.×Co 4 F_3, (61) Lakkundi, (62) *Jahagirdar*, (63) Deshpande.

(*g*) *Gadag Exotics.*—(64) 10-16, (65) 49-2, (66) 3915 Co 3, (67) 10-32-4, (68) 49-1-1, (69) 49-2-1.

1954–55 *Season*

The following varieties were classed as susceptible:—

(1) BAR-7-2-P 5, (2) *G. terbianum*, (3) Some of the selections from 134-Co 2-CW, 170 Co 2 and 125 Co 2-18, etc. (4) A few crosses and backcrosses made at Gadag.

1955–56 *Season*

Of the many types tested, the susceptibles are shown below:—

(1) D.P.L.-15, (2) Empire, (3) Stoneville-2B, (4) Paula, (5) Fox, (6) Erlistaple, (7) Wilds, (8) Sea-land, (9) Many types received from Gadag.

Of the many types tested for the last 3–4 years, the promising ones have been tabulated in Table I:—

The results of promising types from 1953–54 season to 1955–56 season, *i.e.*, from F_1s, F_2s, F_3s and B_1s and B_2s are given in Table II.

DISCUSSION

From Table I it can be seen that resistance can be built up in moderately resistant strains whereas highly susceptible types fail in the first season itself. But as the resistant types or their selections are shy-bearers they can seldom compete with *Laxmi* in yield and the same has been confirmed by feeler trials and hence they can be used only as parents for hybridization.

Studying the crosses involving *Laxmi*, the susceptible parent on one hand and the resistant parents on the other hand like 2196-4 BK, BC 134 CW-3-1-7, XAB-5, and 170 Co2, it is quite evident from the data presented in Table II, that the susceptibility in the F_1 is dominant. In the F_2 generation a small percentage of immune and resistant plants were observed and a small number of immune plants combining yield and resistance were selected and studied in F_3. The results are not much encouraging except in one cross, *viz.*, *Laxmi*×XAB-5. From the B_1 and B_2 data as well it is quite clear that resistance with quality could not be combined in the progenies except in a small percentage of

TABLE I

Sl. No.	Varieties	No. of plants		Percentage of plants				Mean halo length	Ginning
		Grown	Graded	Immune	Res.	M.S.	Sucs.		
1	2196-Siruguppa								
	1953–54	189	10	0·0	50·0	40·0	10·0	24·4	36·0
	1954–55	120	60	86·6	0·0	11·7	1·7		
	1955–56	92	65	75·26	1·69	16·9	6·15		
2	125-Co 2–18								
	1953–54	59	10	0·0	100·0	0·0	0·0	26·7	33·9
	1954–55	128	60	75·0	0·0	20·0	5·0		
	1955–56	91	60	100·0	0·0	0·0	0·0		
3	2196-4-BK								
	1953–54	582	10	0·0	40·0	30·0	30·0	27·4	34·9
	1954–55	248	120	70·8	0·0	20·0	9·2		
	1955–56	94	60	68·34	0·0	6·66	25·0		
4	2196								
	1953–54	35	10	0·0	40·0	0·0	60·0	25·6	35·2
	1954–55	35	21	90·5	0·0	9·5	0·0		
	1955–56	98	61	88·55	0·0	6·55	4·9		
5	BC 134-CW-3-1–7								
	1953–54	403	10	0·0	50·0	0·0	50·0	25·2	32·9
	1954–55	280	141	71·6	0·7	24·1	3·6		
	1955–56	98	58	60·0	0·0	15·0	25·0		
6	BC 68 G 4 1955–56	40	40	10·00	0·0	0·0	0·0	31·5	33·3
7	134-Co 2-M-21–1	28	28	100·0	0·0	0·0	0·0	34·3	..
8	134-Co 2-M-21–2	28	28	100·0	0·0	0·0	0·0	34·7	..

Remarks.—The data are reproduced from the *Annual Progress Report* of the Scheme. The mean halo length and ginning percentage of data is the average of 3 years.

resistant plants which appear in B_2 of the cross between *Laxmi*×XAB 5. It appears that as more and more blood of *Laxmi* is introduced for quality by repeated backcrossing, the resistance goes down.

Looking to Table II again it is seen that from the second set of crosses of Co 4-B 40 on one side and resistant parents, *viz.*, 2196-4 BK, XAB 5 and 125-Co 2-18 on the other side, susceptibility is dominant in F_1 except for a small percentage of resistant plants in Co 4-B 40× 125-Co 2-18 cross. A considerable percentage of immune plants were observed in F_2 of the cross Co 4-B 40×XAB 5. The results obtained in F_3 and B_2 of the cross are much encouraging and appear to be more useful than those obtained in the backcrosses of other parents.

From the remaining set of crosses involving resistant×resistant parents (*vide* items 8–17 in Table II), it is quite clear that the dominance

TABLE II

Sl. No.	Variety	Total No. of plants		Percentage of				Remarks
		Grown	Graded	Immune	Res.	M.S.	Sucs.	
1	*Laxmi* × 2196-4-BK							
	„ F_1 (1953–54)	35	20	0	0	0	100	
	„ F_2 (1954–55)	249	249	24·9	0	40·9	34·2	
	„ F_3 (1955–56)	147	147	46·2	0	8·8	45·1	Total of 5 families
	Backcross to *Laxmi*							
	B_1 (1954–55)	98	98	8·2	1·0	21·4	69·4	
	B_2 (1955–56)	197	197	2·03	0	3·04	94·93	
	2nd BC B_1 (1955–56)	31	31	0	0	0	100	
2	*Laxmi* × BC-134-CW-3-1-7							
	F_1	31	20	0	0	0	100	
	F_2	406	406	30·04	0·2	41·6	28·5	
	F_3	153	153	53·6	14·3	0	32·1	Total of 5 families
	B_1	45	45	4·4	0	33·3	62·3	
	B_2	194	194	6·1	0	4·8	89·1	
	2nd BC B_1	34	34	0	0	0	100	
3	*Laxmi* × XAB_5							
	F_1	30	20	0	0	0	100	
	F_2	402	402	26·6	0·7	37·6	35·1	
	F_3	151	151	92·4	0	3·3	5·3	Total of 5 families
	B_1	113	113	12·4	4·4	40·7	42·5	
	B_2	194	194	35·5	0	19·7	45·43	
	2nd BC B_1	31	31	0	0	3·2	96·8	
4	*Laxmi* × 170–Co 2 F_1	25	20	0	0	0	100	
	F_2	207	207	20·8	0·5	32·8	45·9	
	F_3	40	40	40·0	0	7·5	52·5	Total of 2 families
	B_1	71	71	4·2	0	30·9	64·9	
	B_2	183	183	1·63	0	0·54	97·83	
	2nd BC B_1	49	49	0	0	0	100	
5	Co 4-B-40 × 2196-4-BK							
	F_1	29	20	0	0	0	100	
	F_2	213	213	31·9	0·0	38·9	29·2	
	F_3	59	59	78·1	0	8·4	13·5	Total of 2 families
	2nd BC B_1	31	31	54·9	0	9·7	33·4	
	Co 4-B 40 × XAB 5							
	F_1	25	20	0	0	0	100	
	F_2	402	402	56·9	0·3	29·9	12·9	
6	F_3	129	129	76·0	0	3·1	20·9	Total of 5 families
	B_1	15	15	40·0	0	40	20	
	B_2	149	149	80·3	0	3·1	16·1	
	2nd BC B_1	37	37	43·2	0	24·3	32·5	

TABLE II—*Contd.*

Sl. No.	Variety	Total No. of plants		Percentage of				Remarks
		Grown	Graded	Immune	Res.	M.S.	Sucs.	
7	Co 4-B 40×125-Co2-18							
	F_1	32	20	0	5·0	0	95	
	F_2	337	337	31·7	0	43·1	25·2	
	F_3	46	46	97·8	0	2·2	0	Total of 2 families
	B_1	18	18	22·2	0	39·4	39·4	
	B_2	160	160	36·8	0	18·2	45·0	
	2nd BC B_1	25	25	0	0	32	68	
8	2196-4 BK×BC-134 CW-3-1-7							
	F_1	21	20	5	30	5	60	
	F_2	421	421	89·5	9·2	1·3	0	
	F_3	889	889	79·9	0	5·8	14·3	Total of 30 families
	C_1	35	35	11·4	0	28·7	59·9	
9	*Jinja*×XAB 5							
	F_1	30	20	60	35	0	5	
	F_2	596	596	69·5	8·2	16·2	6·1	
	F_3	883	883	73·5	0·0	4·6	21·9	Total of 100 families
10	125-Co 2-18×XAB 5							
	F_1	22	20	50	40	0	10	
	F_2	198	198	85·8	3·0	6·6	4·6	
	F_3	531	531	90·8	0	2·1	7·1	Total of 22 families
	B_1	6	6	93·4	0	6·6	0	
	B_2	161	161	80·8	0	3·1	16·1	
	C_1	45	45	0	0	0	100	
11	2196-4 BK×XAB 5							
	F_1	28	20	0	35	0	65	
	F_2	249	249	89·0	7·6	22·5	0	
	F_3	365	365	95·1	0	38	1·1	Total of 12 families
12	2196-4 BK×170-Co-2							
	F_1	26	20	0	40	0	60	
	F_2	250	250	68·0	29·6	1·6	0	
	F_3	278	278	91·1	0	4·3	4·8	Total of 10 families
13	2196-4 BK×125-Co 2-18							
	F_1	22	10	0	40	0	60	
	F_2	202	202	67·4	15·9	14·3	2·4	
	F_3	296	296	73·99	0	1·01	25·0	Total of 10 families
14	2196-4 BK×*Jinja*							
	F_1	35	20	0	0	0	100	
	F_2	417	417	55·8	0·8	31·4	5·0	
	F_3	305	305	61·4	0	9·5	29·1	Total of 10 families

TABLE II—*Contd.*

Sl. No.	Variety	Total No. of plants		Percentage of				Remarks
		Grown	Graded	Immune	Res.	M.S.	Sucs.	
15	BC-134-3-1-7×170-Co 2							
	F_1	20	20	0	15	0	85	Total of 11 families
	F_2	248	248	91·9	4·5	3·6	0	
	F_3	325	325	73·6	0	3·7	22·7	
16	BC-134-3-7×125-Co 2-16							
	F_1	26	10	0	0	0	100	Total of 8 families
	F_2	324	324	68·2	5·8	20·2	5·8	
	F_3	224	224	49·3	0	7·1	44·6	
17	BC-134-3-1-7×*Jinja*							
	F_1	32	20	0	10	0	90	Total of 10 families
	F_2	337	337	39·8	20·5	33·8	5·9	
	F_3	307	307	33·5	0	6·1	61·4	

of resistance is observed in varying degrees in F_1. Wherever *Jinja* which is a susceptible parent occurs (items 14 and 17 of Table II), susceptibility automatically becomes dominant. A high degree of resistance can be built up in the F_2 and F_3 in all these resistant crosses except in the crosses involving *Jinja* as one of the parents, namely, 2196-4 BK×*Jinja* and BC 134 CW-3-1-2×*Jinja*.

Some of the crosses, *viz.*, *Jinja*×XAB 5, 125-Co 2-18×XAB 5, 2196-4 BK×XAB 5, BC-134 CW-3-1-7×125 Co 2-18, etc., are most promising. A large number of immune plants have been selected from them for further study. The B_2 of the cross (125-Co 2-18×XAB 5)× XAB 5 is also promising.

CONCLUSIONS

1. It is easy to build up resistance leading to immunity in moderately resistant types, whereas highly susceptible types fail in the initial stages only.

2. High resistance with quality does not go hand in hand as most of the resistant types are shy-bearers.

3. Repeated backcrossing with *Laxmi* does not seem to be desirable as resistance does not combine with quality in subsequent generations.

4. Backcrossing with Co 4-B 40 especially in the cross Co 4-B 40× XAB 5 has shown high promise.

5. The XAB 5 as parent with any cross has shown very high promise, *viz.*, (i) *Jinja*×XAB 5, (ii) 125-Co 2-18×XAB 5, (iii) 2196-4 BK×XAB 5, (iv) Co 4-B 40×XAB 5. Backcrossing with XAB 5 is highly useful. So it is most desirable to use XAB 5 in hybridization work.

6. High degree of resistance has been brought about in crosses involving resistant parent×resistant parent but however good combination of yield and other economic characters is wanting. To bring about the fair combination of yield and other economic characters, coupled with resistance, as few outcrosses were effected and strudied in C_1 generation. Their performances will be watched in C_2 and selections made therefrom. The *inter se* crossing has also been taken up to combine resistance with economic characters.

Summary

A large number of varieties, *viz.*, Punjab-Americans, Dharwar-Americans, Hyderabad-Americans, Egyptians and interspecifics from Surat have been tested under artificial epidemic conditions at Dharwar and a few varieties have shown high promise consistently from 1953–54 to 1955–56.

About 41 crosses inolving quality parents on one side and resistant parents on the other side and among the resistant parents themselves were effected and were studied in F_1, F_2 and F_3 generations (17 promising crosses were studied in F_3). The backcrossing with quality parents was also undertaken and their B_1 and B_2 were studied. Some useful results obtained are given.

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APPENDIX I

Description of the grade followed during		Grades	Remarks
1953–54	1954–55 (Modified one)		
Free	Free	0	Immune
Stray dot on less than three leaves	Stray dot on leaves	1	Resistant
Scattered dots on lamina	Scattered dots on lamina	2	
Entire leaves showing lamina infection only	Entire leaves showing lamina infection only (round, small, reddish to brown spots on leaves)	3	
Entire leaves (Lamina and Veins) of not more than three leaves affected	Spots small, reddish brown, slightly angular, never coalescing and occasionally veins attacked	4	Mildly susceptible
More than three leaves affected but infection not spread to shoots	Similar to grade 4 but the vein infection extends to the surrounding tissues to a little extent	5	
Infection spread over all parts of plants (leaves, shoots and bolls)	Spots angular become large, coalesce and turn black. Vein infection is more severe than in grade 5th and spreads much to the surrounding tissues	6	Susceptible

SOME LABORATORY OBSERVATIONS ON SOIL-UREA MIXTURES

By R. S. Gajendragad[1]

Urea is now becoming a popular fertilizer in the State and is being used on grain crops, sugarcane, and plantation crops. Urea contains about 44–46 per cent. of nitrogen and is therefore the most concentrated solid fertilizer and the most economical in use. But it has certain drawbacks. Urea as such cannot be utilized by plants unless it is converted into ammoniacal form. It is also liable to be lost by leaching between the time of its application and its conversion to ammoniacal form. Since it is to be used only in small quantities its uniform distribution becomes difficult and the general recommendation to overcome this problem is to mix it with equal quantity of dry soil so as to increase its bulk.

In a recent paper Raheja and Yawalkar (1958) have reviewed the work on 'Urea' as fertilizer. They have pointed out quoting the work of Allison, Countarior and Porrand (1925), Morz and Brown (1943), etc., that under tropical conditions the conversion of urea to ammoniacal form is generally complete in 4–5 days and a temperature of 40° C. and soil moisture at 50 per cent. of its water-holding capacity are optimum for its conversion.

Since urea is popular in the State it was felt desirable to test these findings under local conditions, so that suitable methods of application could be evolved, for minimising losses due to leaching before ammonification. Two sets of observations were recorded with soil-urea mixtures in the laboratory at Bangalore.

(i) The rate of conversion of urea-soil mixtures to ammonia, under different soil moisture levels, was observed over a period of one week.

(ii) The keeping quality and physical condition of the urea-soil mixture, at different moisture levels, was observed over a period of one week.

The results observed are briefly as below:

Method: Studies on rate of ammonification.—The rate of conversion of urea was studied on typical red soil of the State. Urea at 30 lb. nitrogen per acre was mixed with soil at 30 per cent. and 50 per cent.

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of its water-holding capacity and kept in the laboratory at the prevailing temperature 26·9 to 28·0° C. and humidity 78–93 per cent. The estimation of ammoniacal nitrogen in the mixture was done daily over a period of one week.

The results are tabulated below:—

(NH_4-N expressed in gm. per 100 gm. of soil)

No. of days	Control	Soil+ Urea at 30% W.H.C.	Percentage of urea converted to NH_4 form	Control	Soil+ Urea at 50% W.H.C.	Percentage of urea converted to NH_4 form
1	0·0100	0·0110	75·5	0·0098	0·0124	94·5
2	0·0093	0·0116	89·9	0·0097	0·0126	96·2
3	0·0089	0·0111	89·5	0·0097	0·0115	87·0
4	0·0087	0·0112	91·8	0·0095	0·0112	86·1
5	0·0083	0·0126	100·0	0·0095	0·0111	85·3
6	0·0090	0·0120	96·0	0·0100	0·0112	82·9

From the above results it is observed that conversion of urea to ammoniacal form reaches maximum within two days in the soil when the moisture level is at 50 per cent. of its water-holding capacity and within five days when the soil moisture level is at 30 per cent. of its water-holding capacity. These results are collaborated with the findings reported above.

It may be also observed from the above results that it will be advantageous if the urea can be mixed with moist soil and kept for a few days and then broadcast as this will facilitate partial conversion of urea to ammonia and reduce the extent of its loss by leaching. But since urea is highly hygroscopic, such a mixture might tend to sweat on standing.

Changes in the physical condition of soil and urea mixture in equal quantity under moisture levels at 0, 30, 50 and 100 per cent. of its water-holding capacity were observed over a week. It was found there was strong caking in mixtures at 50 per cent. and 100 per cent. W.H.C. in first day and they become deliquescent on the second day. But the

mixture at moisture level at 30 per cent. W.H.C. (or 10 per cent. on soil weight) remained fairly friable even up to a fortnight and it can be easily broadcast or drilled with without any change in the physical condition. This indicates that urea can be mixed with equal quantity of moist soil up to 10 per cent. of soil moisture without any harmful effects.

From this it may be recommended that where there is fear of loss by leaching, urea may be mixed with an equal amount of moist soil (10 per cent. moisture) and kept for 2–3 days before application. Application to dry-land crops could be best made a day after soaking rain, as this will leave the soil saturated with moisture and ammonification will proceed rapidly.

Further work is in progress.

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EFFECT OF TREATMENT OF WHEAT SEEDS WITH 2, 4-DICHLORO-PHENOXY ACETIC ACID—PART I

By C. B. Divekar‡

Introduction

The herbicidal activity of the phenoxy acetic acid and its physiological similarity to other growth-regulating substances has directed the attention of many workers towards their use for improving yields of agricultural crops. Like all other growth-regulating substances, phenoxy acetic acid is also effective as growth promoter when employed in low concentrations.

Various attempts have been made in the past by several workers to bring about improvement in crops by treating with low concentrations of 2, 4-dichlorophenoxy acetic acid (hereafter referred to as 2, 4-D) and other compounds acting like hormones. Friendrich (1942) working on potato, Allard *et al.* (1946) working on oats, Amlong and Naundorf (1937) working on radish and Avery and Lhoste (1947) working on wheat could get a favourable increase in growth and yield on treatment of seed with various synthetic hormones. Inhibiting effects on growth of plants, however, have been reported by Allard *et al.* (1946) Croxall and Ogilvie (1946) and Dexter (1943) by treating seeds with various synthetic organic compounds. Kanitkar and his co-workers have attempted to reduce the total stimulus by using low concentrations of synthetic hormones coupled with shorter duration of the treatment. Thus combining various concentrations and durations of treatments it may be possible to define an extensive and effective range of stimulus by the growth substances on plants. The present work is an attempt in this direction, to strike at the optimum level of 2, 4-D that would help improving the yield of wheat crop. The investigation was conducted in pot culture.

Experimental Details

Pure seed of wheat variety Niphad-4 was used in the experiment. The seeds were treated with 2, 4-D in the form of " Dicotox " [a commercial preparation of Messrs. May and Baker (India) Ltd.]. The preparation contains ethyl ester of 2, 4-D. and gives an equivalent of 10% 2, 4-D.

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A preliminary test was conducted to find out whether the treatment of seed with 2, 4-D had any adverse effect on germination of seeds and growth of plants. This was done by noting the germination count and observing the growth of seedlings raised from treated seeds with 2, 4-D concentration ranging from 0·000 p.p.m. to 1000·000 p.p.m. for a duration of 0·2 hour, 2·0 hours and 20·0 hours respectively. The concentrations used were multiples of ten and the same relation was maintained in respect of duration of the treatment also.

The seeds after the treatment for specific durations were washed free of adhering 2, 4-D to ensure that only the absorbed hormone would act upon. Sixteen of the hundred treated seeds were picked at random and were dibbled in pots to half an inch depth. The treatments were replicated four times and the pots were randomised. The seedlings were allowed to grow in pots for 15 days. The morphological observations such as emergence of the seedlings and their height were recorded at the end of five, ten and fifteen days after sowing. The tops of the seedlings were cut close to the surface of the soil and the fresh and dry weights were recorded. The roots were removed by inverting the pots in water for evaluating the extent of root development under various 2, 4-D concentrations. The preliminary test indicated that higher concentrations of 2, 4-D were having adverse effect on the growth of the seedlings. Therefore the following 18 treatments were selected for conducting an exhaustive pot trial and these are given in Table I.

TABLE I

Concentrations of 2, 4-D and the durations of their application

Treatment No.	Duration in hours	Concentration p.p.m.	Treatment No.	Duration in hours	Concentration p.p.m.
1	0·2	0·000	10	2·0	0·010
2	0·2	0·001	11	2·0	0·100
3	0·2	0·010	12	2·0	1·000
4	0·2	0·100	13	2·0	10·000
5	0·2	1·000	14	2·0	100·000
6	0·2	10·000	15	20·0	0·000
7	0·2	100·000	16	20·0	0·001
8	2·0	0·000	17	20·0	0·010
9	2·0	0·001	18	No treatment to serve as control	

Results and Discussion

Emergence counts of the seedlings taken five days after sowing indicated that there were no differences in the emergence due to the various concentrations of 2, 4-D tried. Height of the shoot was also recorded and is presented in Table II.

Table II

Height of the 5-day-old seedlings from seeds treated with various concentrations of 2, 4-D for various durations

Treatment No.	Duration in hours	Concentration p.p.m.	Height in cm.*	Increase or decrease over	
				Control	Water treatment
1	0·2	0·000	3·4	0·5	0·0
2	0·2	0·001	4·0	1·1	0·6
3	0·2	0·010	4·5	1·6	1·1
4	0·2	0·100	3·6	0·7	0·2
5	0·2	1·000	4·7	1·8	1·3
6	0·2	10·000	4·7	1·8	1·3
7	0·2	100·000	4·4	1·5	1·0
8	2·0	0·000	4·0	1·1	0·0
9	2·0	0·001	4·1	1·2	0·1
10	2·0	0·010	5·1	2·2	1·1
11	2·0	0·100	4·1	1·2	0·1
12	2·0	1·000	5·8	2·9	1·8
13	2·0	10·000	4·9	2·0	0·9
14	2·0	100·000	4·5	1·6	0·5
15	20·0	0·000	3·9	1·0	0·0
16	20·0	0·001	4·4	1·5	0·5
17	20·0	0·010	5·1	1·2	1·2
18	Control	..	2·9	0·0	

* Average of four replications.

Least significant difference = 0·68 cm.

The data on height of the 5-day-old seedlings were analysed statistically and it was found that the differences in the heights were highly significant. It could be seen from Table II that the increase in height of the seedlings over the control due to water alone, in the duration of 2 hours and 20 hours, is almost double that of the 0·2 hour duration.

Further the association of 2, 4-D with water in all durations of treatments brings about a greater increase in height of the seedlings than due to water alone. This increase is significant in all the 2, 4-D concentrations except in 0·001 p.p.m. and 0·100 p.p.m. both for 0·2 hour and 2·0-hour duration and in 0·001 p.p.m. concentration for 20-hour duration.

The measurement of height of the seedlings at the end of 10 days showed trend similar to the one obtained at the end of 5th day.

The height of the 15-day-old seedlings is given in Table III.

TABLE III

Height of the 15-day-old seedlings raised from seeds treated with various concentrations of 2, 4-D for various durations

Treatment No.	Duration in hours	Concentration p.p.m.	Height in cm.*	Increase or decrease over	
				Control	Water treatment
1	0·2	0·000	19·5	2·5	0·0
2	0·2	0·001	18·0	1·0	—1·5
3	0·2	0·010	20·6	3·6	1·1
4	0·2	0·100	21·2	4·2	1·7
5	0·2	1·000	22·2	5·2	2·7
6	0·2	10·000	20·6	3·6	1·1
7	0·2	100·000	20·2	3·2	0·7
8	2·0	0·000	23·0	6·0	0·0
9	2·0	0·001	21·3	4·3	—1·7
10	2·0	0·010	21·0	4·0	—2·0
11	2·0	0·100	21·4	4·4	—1·6
12	2·0	1·000	24·0	7·0	1·0
13	2·0	10·000	24·4	7·4	1·4
14	2·0	100·000	21·4	4·4	—1·6
15	20·0	0·000	18·9	1·9	0·0
16	20·0	0·001	22·0	5·0	3·1
17	20·0	0·010	22·0	5·0	3·1
18	Control	..	17·0	0·0	..

* Average of four replications. Least significant difference = 3·6 cm.

The statistical analysis of the data for height of the seedlings at the end of 15 days period showed that the differences in the heights were

significant at 5% level. It can be seen from Table III that there is a significant increase in the height of the seedlings over that of the control, due to water treatment for 2 hours duration. The increase in height in this treatment is to the extent of 35 per cent. as compared to 15 per cent. and 10 per cent. respectively in 0·2 hour and 20·0 hours duration. It is further seen that majority of the 2, 4-D treatments were able to show a greater increase in the height of the seedlings than under the control. Even in these treatments the increase was more in the 2-hour duration than in the durations of 0·2 hour and 20·0 hour. Similar results are reported by Amlong and Naundorf (1937) and Avery and Lhoste (1947). The retardation in the growth of the seedlings observed by Allard *et al.* (1946), Grace (1937) and Taylor (1946) may be attributed to the direct contact of the plant parts with

TABLE IV

Fresh weight of plants raised from seeds treated with different concentrations of 2, 4-*D for various durations*

Treatment No.	Duration in hours	Concentration p.p.m.	Fresh weight in mg./plant*	Increase or decrease over	
				Control	Water treatment
1	0·2	0·000	206·0	40·3	0·0
2	0·2	0·001	166·2	0·5	—39·8
3	0·2	0·010	191·7	26·0	—14·3
4	0·2	0·100	219·2	53·5	13·2
5	0·2	1·000	213·7	48·0	7·7
6	0·2	10·000	190·0	24·3	—16·0
7	0·2	100·000	214·5	48·8	8·5
8	2·0	0·000	221·5	55·8	0·0
9	2·0	0·001	229·0	63·3	7·5
10	2·0	0·010	210·7	45·0	—10·8
11	2·0	0·100	216·5	50·8	—5·0
12	2·0	1·000	227·5	61·8	6·0
13	2·0	10·000	227·7	62·0	6·2
14	2·0	100·000	215·5	49·8	—6·0
15	20·0	0·000	165·2	—0·5	0·0
16	20·0	0·001	214·7	49·0	49·5
17	20·0	0·010	201·2	35·5	36·0
18	Control	..	165·7	0·0	..

* Average of four replications. Least significant difference = 21·4 mgs.

hormones in solution or in soil which might have facilitated a continued absorption of the hormone resulting in a relatively higher hormone level in the plant body causing harmful effects on their growth.

In Tables IV and V are given respectively the fresh and dry weights of the samples collected at the close of the experiment.

TABLE V

Dry weight of plants raised from seeds treated with different concentrations of 2, 4-D for various durations

Treatment No.	Duration in hours	Concentration p.p.m.	Dry weight in mg./plant*	Increase or decrease over	
				Control	Water treatment
1	0·2	0·000	18·7	0·2	0·0
2	0·2	0·001	18·4	—0·1	—0·3
3	0·2	0·010	20·6	2·1	1·9
4	0·2	0·100	21·7	3·2	3·0
5	0·2	1·000	19·3	0·8	0·6
6	0·2	10·000	19·6	1·1	0·9
7	0·2	100·000	19·0	0·5	0·3
8	2·0	0·000	19·8	1·3	0·0
9	2·0	0·001	22·2	3·7	2·4
10	2·0	0·010	21·4	2·9	1·6
11	2·0	0·100	18·8	0·3	—1·0
12	2·0	1·000	21·1	2·6	1·3
13	2·0	10·000	21·3	2·8	1·5
14	2·0	100·000	19·9	1·4	0·1
15	20·0	0·000	17·2	—1·3	0·0
16	20·0	0·001	19·0	0·5	1·8
17	20·0	0·010	18·7	0·2	1·5
18	Control	..	18·5	0·0	..

* Average of four replications. Least significant difference = 1·81 mg.

It can be observed from the above data that treatment with 2,4-D at all the concentrations tried caused increase in dry weight of shoots, no matter how small the differences are. The effect of hormone treatment is well pronounced especially in the treatment 0·1000 p.p.m. for 0·2 hour duration and 0·001, 0·010, 1·00 and 10·000 p.p.m. concentration all for 2 hours duration.

The data presented in Table IV reveal that the treatments with 0·001 p.p.m., 1·000 p.p.m. and 10·000 p.p.m. concentration all for 2-hour duration showed an increase of about 34 per cent. in fresh weight over the control. The fresh weights of seedlings consisted of the dry matter and the water associated with it. The increase in the fresh weights noticed may be attributed to the various metabolic activities of the seedling like photosynthesis, respiration, etc., causing differential absorption of the nutrients. A change in the rate of absorption of water from the soil solution does affect the fresh weight of plant tissue. The different hormonal treatments might have caused differential absorption of water from the soil maintained at the same moisture level. It is therefore considered that the increase or decrease in the total weight of the seedlings is due to change in the rate of physiological processes. The fresh weight of shoot is found to have increased even more prominently than the height of the seedlings. These observations indicate that the hormone treatment of seeds of 2-hour duration seems to be optimum while the treatment of 0·2-hour and 20·0-hour duration to be not effective. This generalisation is in conformity with the observations made by Stewart and Hamner (1942).

The increase in the dry matter of shoots is not as prominent as the fresh weight. When the treatment of 2, 4-D at 0·2-hour and 20·0-hours are compared with those at 2·0-hour duration, it is observed that normally the latter duration shows a greater increase in the weight of shoots. Grace (1937) reports an increase in the dry weight of tops of wheat with treatment of low concentrations of various hormones. Further he records decrease in the growth of shoots and roots at high concentrations. Kisselbach (1943) obtained some indications of increased dry weight of shoots in corn, using hormones. But Mitchell and Hamner (1938) found that the dry weight of bean plants was reduced by treating with indole acetic acid. The present work of the author and the results reported by Grace (1937) and others, therefore, confirm that the proper response of the hormonal treatment by the developing seedlings depends upon the amount of stimulus acquired by them as a result of seed treatment.

Many of the investigators have considered growth from height measurements of the plants while Taylor (1946) and others working with 2, 4-D have tried to evaluate growth in terms of dry weight. The evaluation in terms of dry weight does not rightly express the dynamic condition of the living plant. Determination of the fresh weight and the water associated with it would enable one to visualise the state of metabolic activities of the plants more precisely.

It is interesting to note that in wheat variety Niphad-4 a distinct increase in fresh weight of shoot was obtained in almost all the treatments with 2, 4-D. However there was a meagre response towards the dry matter production under similar treatments. The water associated with the fresh weight of the seedlings was evaluated by calculating the water content of the seedlings in different treatments and is presented in Table VI.

TABLE VI

Water content of the plants raised from seeds treated with different concentrations of 2, 4-D for various durations

Treatment No.	Duration in hours	Concentration p.p.m.	Water content in mg./plant*	Increase or decrease over	
				Control	Water treatment
1	0·2	0·000	187·3	40·1	0·0
2	0·2	0·001	147·8	0·6	—39·5
3	0·2	0·010	171·2	24·0	—16·2
4	0·2	0·100	197·5	50·3	10·2
5	0·2	1·000	194·4	47·2	7·1
6	0·2	10·000	170·4	23·2	—16·9
7	0·2	100·000	195·4	48·2	8·1
8	2·0	0·000	201·7	54·5	0·0
9	2·0	0·001	206·8	59·6	5·1
10	2·0	0·010	189·8	42·5	—11·9
11	2·0	0·100	197·6	50·4	—4·1
12	2·0	1·000	206·4	59·2	4·7
13	2·0	10·000	205·4	58·2	3·7
14	2·0	100·000	195·6	48·4	—6·1
15	20·0	0·000	148·0	0·8	0·0
16	20·00	0·001	195·7	48·5	41·7
17	20·0	0·010	182·5	35·3	28·5
18	Control	..	147·2	..	

* Average of four replications. Least significant difference = 23·5 mg.

The statistical analysis of the data on the water content of the wheat seedlings shows that the differences are highly significant at 1 per cent. level. It could be seen from Table VI that the water content of the shoot is significantly more in all the treatments except the 0·001 p.p.m. for 0·2 hour and water treatment for 20 hour duration.

Especially in case of the 0·001 p.p.m. for 2-hour duration treatment the water content of the shoot is found to be more than 36 per cent. over the control. This increase in the water content of shoots observed in various treatments appears to be due to the combined effect of water and 2, 4-D together rather than the 2, 4-D alone, as could be seen from the last two columns of Table VI.

It is observed that the hydration is more in the 2-hour duration treatment than in the one for 0·2 hour. Mitchell and Marth (1950) were able to find similar effects on water associated with the solid matter in the bean plants sprayed with various chemicals including 2, 4-D.

Observations in respect of dry weights of roots under various treatments showed that their development was adversely affected by the 2, 4-D treatment. All the 2, 4-D treatments showed a reduction in the dry weight when compared with the control. This reduction was significant in 0·010 p.p.m. and 1·000 p.p.m. for 2 hours and 0·000 p.p.m. for 20-hour duration. Thus while dry matter of shoot tends to increase, the dry weight of roots tends to decrease as the result of treating the seeds with 2, 4-D. In order to find out the net effect of 2, 4-D treatment on the growth of seedlings the dry weights of shoots and roots were added up and analysed statistically. It is surprising to note that only in case of 0·001 p.p.m. for 2·0-hour duration a significant increase in the dry weight of the entire seedling is noticed.

It is a well-known fact that 2, 4-D is a phenoxy compound having herbicidal action. A number of reports indicate that the herbicidal action is accompanied by increased respiratory activity and oxidation of carbohydrates. Kelly and Avery (1949) have reported 20 per cent. more oxygen uptake in avena coleoptile segments due to treatment of 2, 4-D. Brown (1946), Smith *et al.* (1947) and Hansen (1946) have also reported an increase in carbohydrate output due to 2, 4-D treatments in various plant species. Pratt (1938) reported inhibition of growth in wheat seedling in terms of dry weight while the oxygen uptake had increased up to 50 per cent. when treated with Indole acetic acid. Taylor has shown that the dry weight of wheat seedlings was reduced by 29 per cent. over control with 2, 4-D treatment. In view of the above investigations by several workers the decrease in the dry weight of wheat seedlings obtained in the present pot trials may be attributed only to the enhanced respiratory activity resulting from the 2, 4-D treatments.

Summary

1. Response of wheat variety Niphad-4 to the treatment of seeds with low concentrations of 2, 4-Dichlorophenoxy acetic acid for various

durations in the form of " Dicotox " of Messrs. May and Baker (India) Ltd. was investigated in the pot culture experiments.

2. The emergence count of the seedlings did not show differences due to the 2, 4-D treatments.

3. Height measurements of the seedlings recorded 5 days after sowing showed that the water treatment for the duration of 2 hours and 20 hours produced increase in height over the control treatment almost double than that in the treatment for 0·2 hour duration.

The height measurements recorded 15 days after sowing showed a significant increase in height over that of the control due to water treatment for 2 hours duration. This increase was to the extent of 35 per cent. It is further observed that there is prominent increase in height due to 2, 4-D treatments in 2-hour duration than in the duration of 0·2 hour and 20 hours.

4. There was a significant increase in the fresh weights of the shoots. The treatment of 0·001 p.p.m. and 10·000 p.p.m. concentration for 2 hours duration showed an increase in height of 38 per cent. over that of control.

5. Observations of the dry weight of shoots indicated that almost all the 2, 4-D treatments showed a slight trend towards acceleration as compared to the control treatment.

6. The water content of shoots is found to be significantly more than the control in almost all the 2, 4-D treatments. This increase was of higher order in treatment for 2-hour duration. In case of 0·001 p.p.m. 2 hour duration treatment the water content of the plant shoot is found to be 36 per cent. more than the control treatment.

7. The root development of the 2, 4-D treatment as judged by their dry weight was found to be adversely affected as compared to the control.

8. The dry matter of shoot tends to increase, the dry weight of roots tends to decrease with the result only in 0·001 p.p.m. for 2-hour duration the weight of the entire seedling is found to have significantly increased over the control.

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A NOTE ON THE CONTROL OF PADDY GALL FLY

By H. V. Katarki[1] and G. P. Bhagavat[2]

(Communicated by Dr. M. Puttarudriah, Government Entomologist)

I. Introduction

Paddy gall fly (*Pachydiplosis oryzæ*) may be considered to be one of the most important pests of paddy in coastal districts of Mysore State. Some of the improved strains of paddy, namely, Jaddu, 1061 and red halaga 244 which are very popular with cultivators and the local varieties in North Kanara tracts are susceptible to paddy gall fly. During the years of epidemic the attack was noted to be as high as fifty per cent. or even more. The pest is popularly called " Kane ", " Anekombu ", " Silver Shoot ", etc. This pest has also been observed in other places like Dharwar, Shimoga, Kolar, Mysore and Hassan Districts to a slight extent.

In view of the seriousness of the problem, a scheme to investigate the bionomics and control of this pest has been in operation at Kumta for the last several years and a great deal of useful information on seasonal incidence, life-history and control measure has been collected. Several insecticides were found to be effective on the pest in reducing its incidence and thus help in increasing the yield of paddy. It is intended in this note to summarise the information for use in Plant Protection work.

II. Nature of Damage

The gall fly lays its eggs on the leaf sheath. The maggots after hatching from these eggs enter into the growing bud at the base of paddy plants. They start feeding on the growing tips and cause the gall formation. The gall elongates becoming a long hollow tube which is dirty white, pink or pale green with a green tip. This long hollow tube thus formed which is dirty white is popularly known as " Silver Shoot ". A single larva is present in each gall. The larva completes its growth in the gall and then pupates. By the time the silver shoot becomes visible, the larva would have usually pupated. Pupation takes place at the base of the silver tube. When ready to emerge, the pupa works its way up the tube and an emergence hole is bored on the silver tube at the junction of the silver tube and the green portion of the blade. Only the young plants and tillers are affected. The plants

with the silver tubes do not bear ear-heads and thus reduce the yield to a considerable extent.

III. Alternate Host and Infestation

It has been observed that "Gaint grass" and "Gubbi hullu" growing on the bunds and in the vicinity of the paddy plots are the alternate hosts of this insect. These are heavily infected; the attack commencing in the last week of May with a rainfall of 10–20 inches; and continuing in June and July. The percentage of infection ranges from 30–35 per cent. in the month of June, while it is 1–3 per cent. in the paddy nurseries; There would be no transplanted paddy at this time in the locality. During the tillering stage of paddy in the field, *i.e.*, for a month and half after transplantation, the attack of gall fly is heavy.

IV. Life-History

A comparative study of the life-history of the gall fly on the grasses and paddy was made. On grasses the life period of the insect from egg to adult was found to range from 9–14 days (egg 2–4 days, maggots 5–7 days, pupa 2–3 days); while on paddy it was 19–26 days (egg 3–4 days, maggot 13–18 days, pupa 3–4 days). The development of the insect stages on grasses was rapid, completing the life-cycle 10–12 days earlier than on paddy. After completing one or two generations rapidly on the grasses by about the last week of July, the pest takes up the paddy which by that time would have been transplanted. Thereafter the attack on grasses reduces but continues on paddy till the end of September and subsides later. The eggs are yellow, elongated and laid generally on the leaf sheath and also on water-surface in the field. After hatching, the maggot enters into the growing bud at the base of paddy plant, feeds and produces a silvery shoot. Actually the silver shoot exhibits itself after the damage is caused and when the pest is in the pupal stage. Larval and pupal stages are within the green tubular gall at the base of the plant. The number of eggs laid by single female varies from 120–175.

The female, in enclosures, was found to lay eggs in the nights from 10 P.M. to 4 A.M. The fertilized eggs laid on water-surface hatched in water after three days and larvæ survived for 3–4 days.

V. Natural Enemies

Platygaster sp. is a polyembryonic egg-larval parasite of paddy gall fly. The life-history of the parasite is found to be about 30 days. The parasitic cocoons are also found inside the silver shoot. Each cocoon contains 25 parasitic flies. The parasite appears rather late

in the season. Heavy percentage of parasitisation is seen in the months of September and October when the incidence of the pest has declined.

VI. Control Measures

This pest, being an internal feeder, is difficult to control. But there are some insecticides which can reduce the incidence when applied. Usually the attack is made out in the field only when silver shoots are visible, *i.e.*, when the pest is in the pupal stage. Therefore insecticidal treatment must be carried out from the early stages and repeated a number of times.

A number of insecticidal trials were laid out for the control of "Kane" pest. Endrex, Folidol and Ekatox E.C. 50 per cent. and Basudin were tried at 0·1 per cent. and 0·05 per cent. and were found to be effective in reducing the infestation to a great extent, and increasing the yield. There was not much difference in reduction of infestation between 0·1 per cent. and 0·05 per cent. strengths. Therefore it is advisable to spray the insecticides at 0·05 per cent. In all, 3–4 sprays have been found necessary to reduce the attack. The first spray should be given about a week after transplanting and the remaining 2 or 3 sprays at an interval of 2–3 weeks.

Insecticidal application in the form of an oil film over water in the paddy field was tested and found to kill the maggots after they hatched from eggs laid on water. So crude oil saturated with 5 per cent. Dieldrin (Tech.) is to be added drop by drop on water-surface at 2 or 3 ounces, per gunta.

Method of Preparing the Oil

One gallon of crude oil is heated and then cooled. Half a pound of Dieldrin (Tech.) is finely powdered and thoroughly mixed with the oil. This oil film also is to be applied 3–4 times during the season at an interval of 2–3 weeks as done with other insecticides.

EFFICACY OF DIFFERENT SOURCES OF NITROGEN, *i.e.*, UREA AND AMMONIUM NITRATE COMPARED TO AMMONIUM SULPHATE, WITH AND WITHOUT PHOSPHORIC ACID, IN INCREASING THE YIELD OF COTTON ON B.C. SOILS UNDER TUNGABHADRA PROJECT

By P. Ambadasrao*

Introduction

Black cotton soils cover sixty per cent. of the commanded area of this project and these soils are fixed for light irrigation. Different crops are to be raised under irrigation and the surest way of increasing the crop yields is by adequate manuring. Cultivators are very familiar with ammonium sulphate for its capacity to raise the yield of crops and they insist on its use. India cannot manufacture ammonium sulphate in sufficient quantity to meet its ever-increasing demand and hence an alternate source of nitrogen, equally efficient in increasing the yields of crop has to be introduced and the cultivators should be made impressed of the efficacy of other nitrogenous manures, such as urea, ammonium nitrate, etc. It is also felt that the residual ill-effects of SO_4' ion, by continuous use of ammonium sulphate on some of our acid and neutral soils, should be minimised by using alternate nitrogen sources. With this in view, the experiments were laid out on this Research Station, with different sources of nitrogen fertilizers with and without phosphoric acid on cotton.

Experimental Details

Soil.—Black cotton soil.

Variety.—Laxmi.

Sources of N.—Ammonium sulphate, urea and ammonium nitrate.

Levels of N.—0, 20 and 40 lb. of N per acre.

Levels of P.—0, 10, 20 lb. of P_2O_5 per acre.

Treatments.—Nine.

Replications.—Three.

Lay-out.—Randomised block.

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TABLE I

Sl. No.	Treatment Lb. N	Acre P	Yield of kapas in lb. per acre								
			Ammonium sulphate			Ammonium nitrate			Urea		
			1955–56	1956–67	1957–58	1955–56	1956–57	1957–58	1955–56	1956–57	1957–58
1.	Control		503	184	341	664	289	329	474	150	454
2.	0	10	548	238	521	615	144	323	617	263	300
3.	0	20	376	153	321	473	207	394	335	174	273
4.	20	0	659	297	537	669	238	494	750	168	618
5.	20	10	785	245	618	520	344	527	575	281	579
6.	20	20	699	152	509	557	137	500	659	209	590
7.	40	0	744	228	796	685	289	776	682	144	709
8.	40	10	763	186	812	745	187	612	561	168	770
9.	40	20	711	147	639	788	229	657	639	353	606

C.D. due to treatment:
1955–56 .. 241 1956–57 .. 134 1957–58 .. 189

Results and Discussions

This experiment was conducted for three years from 1955–58 under protective irrigation. The yields obtained are given in Table I.

The yields, given in Table I, are very low when compared to other places due to inadequate growth conditions when compared to other places. The yields were also affected by attack of red-leaf disease and as well as to bad opening of bolls. The results in 1956–57 are very low due to very bad season, specially for American cotton. The experiments in all the three years were significant. The efficacy of different manures and the role of P alone and in combination with other nitrogen fertilizers in increasing the cotton yield are discussed below:—

Response of Different Sources of N to Cotton

The three different sources of N, *i.e.*, ammonium sulphate, ammonium nitrate and urea have no differential response on the yield of cotton (Table II) when tried on equal nitrogen basis. They are

Table II

Yield of seed cotton in lb. per acre

Year	Ammonium sulphate	Ammonium nitrate	Urea
1955–56 ..	643	635	588
1956–57 ..	203	228	212
1957–58 ..	566	512	571
Mean ..	471	458	457
Percentage over lowest yield ..	103	100	100

equally good as sources of nitrogen. Christidis and Harrison (1955) have cited many instances from North Carolina, Egypt and other places, where ammonium sulphate, ammonium nitrate, sodium nitrate, urea and ammonium phosphate have shown similar response to yield. Other investigators, S. Sen and Sher Singh Bains (1952) and Chandanani (1954), experimenting on cotton wheat, jowar and paddy with different sources of N, such as ammonium nitrate, sodium nitrate, urea and potassium nitrate, have reported that all the fertilizers behave similarly in their response to crop yield.

General Response of N to Cotton

Table III

Yield of seed cotton in lb. per acre

Year	N_0	N_{20}	N_{40}
1955–56 ..	512	653	702
1956–57 ..	191	236	217
1957–58 ..	361	552	708
Mean ..	355	480	542
Percentage over control	100	135·2	152·7

The cotton responds to application of N as other crops and yields significantly higher than control. The response seems to be linear with increasing dozes of N up to 40 lb. per acre as noticed in other trials on this farm. This fact has been noted by Dastur (1944) and Christidis and Harrison (1955).

General Response of P to Cotton

Table IV

Yield of seed cotton in lb. per acre

Year	P_0	P_{10}	P_{20}
1955–56 ..	648	626	582
1956–57 ..	206	228	209
1957–58 ..	561	562	499
Mean ..	472	475	430
Percentage over control	100	100	91·1

The different doses of P (Table IV) have not shown any response to cotton and 20 lb. of P_2O_5 per acre has actually reduced the yield. The ineffectiveness of P application on cotton yield has been noted by

many investigators. Dastur (1944) did not get any response of either P or K to cotton in Punjab. Kapp *et al.* (1953) found that seed cotton yield did not increase by application of P even at various places, while Krantz *et al.* (1949) found response of P to cotton in a very P-deficient soil.

General Response of N, P and N + P to Cotton

Table V

Yield of seed cotton in lb. per acre

Year	Control	N	P	N+P
1955–56 ..	547	698	494	677
1956–57 ..	181	227	196	228
1957–58 ..	375	655	355	618
Mean ..	368	527	355	505
Percentage over control	100	143·2	94·5	137·2

General responses of N, P and N+P (Table V) are calculated. It is seen that cotton responds only to N and not to P. Even N+P has not yielded more than N. As a matter of fact cotton yield is depressed due to P application. This can be seen by comparing the yields of control (368 lb.), P (355 lb.), N (527 lb.) and N+P (505 lb.). This is probably due to imbalance created by the addition of P. This reduction in yield due to addition of P is noteworthy because the same plots, which were under rotation with jowar, have shown response of P to jowar. Little bit depression in yield of paddy due to addition of P along with green manure and other manures is seen on this Farm on light-textured soils.

Summary

1. Different sources of N, *i.e.*, ammonium sulphate, urea and ammonium nitrate are on par in their response to cotton yield on equal nitrogen basis.

2. Cotton responds to N and the response due to different doses of N seems to be linear.

3. P does not increase the yield of cotton but its application in combination with different sources of N has depressed the yield.

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General and Review Article

A RESUME OF WORK DONE ON COTTON WILT AT DHARWAR

By S. B. Priyavratha Rao[1]

Introduction

Cotton occupies a foremost place among the commercial crops in the Bombay Karnatak region, and forms the main source of income to the growers in the region. Because of its importance, any factor or factors which might lower the price of the produce or affect production is bound to cause considerable economic disturbance to a large class of people, such as the grower, the trader and the manufacturer. Among such factors are the diseases due to plant parasites which affect the crop yields to a considerable degree. Of the various diseases to which a cotton crop is subject, the wilt disease is by far the most important disease in this tract as far as the *herbaceum* group of cottons are concerned. Fortunately, all American Cottons grown in this region and in India are immune to wilt. The disease is widespread and the amount of damage to the cotton crop, though considerable, varies according to localities and seasons. Prior to the introduction of the wilt-resistant varieties like Jayadhar, in the heavily affected soils, the loss is estimated up to 60 per cent. but on an average treating 10–15 per cent. to be the annual loss due to wilt disease is not wide off the mark.

Work on cotton wilt was mentioned for the first time in the *Annual Report of the Department of Agriculture, Bombay State*, only the year 1921–22, wherein a passing reference was made to the effect—" that a careful study of wilt of Cotton is being made by the Cotton Breeder at Dharwar in collaboration with the Plant Pathologist, at Poona". Wilt is a common disease of plants which is met with in several cultivated crops belonging to different species. Wilt, in cotton, is caused by *Fusarium vasinfectum* and has attracted lot of attention of Plant Breeders and Plant Pathologists in India and other countries. This review has been dealt with in two parts, the first comprising of the mycological aspect of the causal organism and the second part pertains to the breeding procedure adopted in evolving wilt-resistant cotton strains.

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Section A

Realising the great economic importance of the wilt disease in cotton, in 1923, the Indian Central Cotton Committee, Bombay, sponsored a special scheme for the thorough investigation of the wilt disease on cotton. The Bombay Karnatak area being notorious for this disease, this investigation was started at the Government Experimental Farm at Dharwar, in September 1923. Research both in the laboratory, green-house, and in the fields were carried out for nearly ten years under the scheme (from September 1923 to March 1933). The main conclusions arrived at in the scheme are as follows:—

The cause of the wilt disease of cotton is a strain of the fungus—*Fusarium vasinfectum* (Atkinson). It belongs to the group of vascular parasites which are responsible for diseases in cabbage, flax, tomato, water-melon and many other crops. The causal fungus, though a facultative saprophyte, is highly specialised in its parasitic relations.

The disease appears about 15–20 days after sowing. The presence of the disease in a very early stage can be marked by yellowing or mottling of the cotyledonary leaves. They do not lose their shape but drop down with a slight touch. The most obvious end result of the affected plants is what is called "wilting", which generally proceeds in the leaves from the base upwards, the shoot finally hanging down limply. The wilted leaves may become yellow and turn brown, by which time the plant is dead. Plants may succumb at any stage of their growth from seedlings barely two weeks old to adult plants. While gradual wilting is the rule, plants which have wilted all too suddenly are not uncommon. Plants with partial attack are of frequent occurrence. Wilted plants do not show any discolouration externally either on the stem or root. On removing the bark, however, the woody tissues below are found blackened either in streaks or in strips. Such roots, when split open, show dark streaks along the vascular strands. The streaks in advanced cases of attack could be traced in the tap root and in most of the side shoots and also higher up in the stem and branches.

It is necessary to state here, that external symptoms of affected plants by *Fusarium vasinfectum*, may also be caused or exhibited by other fungi like *Rhizoctonia bataticola* (root-rot); *Sclerotium rolfsi*, and the borer attack. All these cause "*wilting*" of plants. But these can be differentiated only by further detailed observations. In the case of root-rot, the hypocotyle region is often discoloured and shredded; while in sclerotium, the stem is covered with mycelial growth with characteristic mustard-seed-like sclerotia. In case of the borer attack, there is distinct swelling of the root showing tunnels caused by the borer, more often with the borer inside the tunnel.

The cultural and nutrition studies of the fungus does not indicate any marked decrease of the disease with the various soil treatments tried.[1] Variations in the kind of soil, in moisture, in soil reaction are of too little use. Application of organic manure (Farmyard manure), in heavy doses of 40 tons per acre, seem to control the disease in the later stages of the crop growth.

Temperature studies of the fungus showed that it can tolerate a wide range from 20–40° C., with an optimum at about 28° C., its thermal death point being beyond 30° C.

The fungus is found pretty deep (up to 20″) in the soil. The soil temperature below 6″ does not rise above an average of 30° C. The fungus, therefore, once introduced can remain in the soil for a number of years. It has been known to survive for seven years in a field which was not sown with susceptible varieties of cotton during the period.

There appears to be a close connection, however, between the temperature of the soil, and the virulence of the disease. The disease is very severe at temperature between 20° C. and 27° C.; decreases between 28° C. and 31° C., and is completely stopped at 32° C. and above. Field experiments based on the results of this study (which involved hot-weather cultivation, sowing on ridges as against the ordinary practice of flats, and in the time of sowing) have not yielded satisfactory results.

It has been found out that the disease is carried inside the seed. The possibility of introduction of the wilt organism into the soil by way of seed has been proved. The wilt disease of cotton is not indigenous to the Karnatic tract, but was introduced by the distribution of Broach Cotton in this region, in the year 1912.

The method of preparation of cotton wilt compost for artificially infecting the soil and thus create a wilt-sick soil was worked out. Dharwar-1, a susceptible variety, was sown thickly at a high seed-rate of 20 lb. per acre in the month of August. The plants are uprooted in October and chaffed into small pieces. A layer of 3–4″ thick was layed on the bottom of the pit and water sufficient to wet the material was sprinkled on it. Over this, a layer of infected soil, 1–2″ thick, was put and in this way the whole pit was filled with alternate layers of the chaffed material and infected soil. The depth of the pit is 3′ and length and breadth being according to the needs. Twelve layers like this were put in the pit and the soil added containing 450 one-litre flasks of the fungus developed on cotton-seed-meal for one month. (Originally, Richard's media was used for the preparation of the inoculum of the cotton wilt fungus. This medium being very expensive was, therefore, substituted by the cotton-seed-meal on which the cotton wilt fungus

makes rapid growth. This is suitable besides being much cheaper.) The material in the pit is to be turned over once in four to six months time. The well-rooted compost is uniformly spread in the wilt plots four weeks before sowing, and the plot is harrowed twice to mix it well and uniformly. This procedure of adding wilt compost annually will keep the wilt-sick soil under ideal conditions for yield testing of breeding material.

The results of these investigations bearing upon a delicately balanced relationship between the host and the parasite and exposing its extreme variability with comparatively small changes in environmental complexes, led to the conclusion that the only practical way of controlling this disease was through the development of resistant strains.

The existence of physiological forms in morphological species of pathogenic fungi has been proved in many cases (*viz.*, rusts, smuts, mildews, etc.). It has also been noticed in Fusaria. It is not known whether the Indian Fusaria of different places such as Dharwar, Jalgaon, Akola, Broach, and Cawnpur are identical in respect of that parasitism and other characters. In attempting to develop cotton varieties resistant to wilt, it is essential to know these Fusaria with regard to their number, geographical distribution, and pathogenic properties. Without such a study, the development of resistant varieties will not be complete. It is necessary to know the reaction of resistant varieties to all the physiologic forms known to exist, at the places where these varieties are to be introduced.

Physiologic specialisation in *Fusarium vasinfectum*, if any, was also studied with a view to make differentials. Much of the utility of the investigation of physiologic specialisation is in connection with inheritance of disease resistance. The knowledge of the mechanism of inheritance of a character is a signpost marking the breeder's path. If the genetics of the characters concerned is understood, the result of each step can be predicted in advance, and the synthetic plant breeding attains the exactness of a science, resulting in fruitful results in the shortest time. By knowing the various forms, and the reaction of the cotton varieties to these forms, it is possible to synthetically build up resistance to all forms by proper hybridisation.

After comparative study of the various isolations from Dharwar, from Egyptian and American material, it was suggested that within the variety of *Fusarium vasinfectum* the forms already known, the Arkansas strain (from V. H. Young), the Dharwar strain, and the Egyptian strain (from Fahmy) may be designated as forma-1, forma-2 and forma-3 respectively. The Broach strains and the Nagpur strain (Dastur's A strain) be also designated as forma-4 and forma-5 respectively, should

they be found to be distinct from the above three forms on races. Further work on physiological races based on isolations of *Fusarium vasinfectum* from the different cotton-growing areas in the Bombay Presidency have failed to reveal any differences in respect of pathogenicity. There are indications, however, that the Khandesh strain of *Fusarium vasinfectum* has slightly higher temperature relations for the development of wilt than the Broach or the Dharwar strain. The variations in the culture characteristics, on the other hand, fluctuate within type limits, and hence are not a vital factor in the problem of selection and breeding for resistance to cotton wilt. It can thus be said that the absence of selective parasitism in the cotton wilt fungus greatly simplifies the problem of producing resistant varieties.

The nature of resistance can be explained in two ways, *viz.*, (i) those cases of resistance wherein due to production in the host, of certain special tissues such as cork, or cuticle that the parasite entry is prohibited (morphological). (ii) Those cases, wherein the parasite, after penetration in the host tissue, is unable to make any headway (physiological). The first case was studied by a research scholar, in the original scheme, by making histological examination of the susceptible and resistant types. The results indicated that it is more physiological rather than morphological. The second case remains to be studied. In order to follow this, a thorough study of the metabolism and temperature relations of the fungus in relation to the composition and physiology of the host is absolutely essential.

In the year 1930, the then Special Cotton Mycologist, Dharwar, submitted a new scheme to the I.C.C.C., Bombay, for starting Research Work on the biochemical aspects of the cotton plant, with a view to understand the nature of disease resistance. The Committee turned down the scheme on the ground that it was more in the realm of fundamental research and more of an academic interest only. It was also of the view that less attention should be paid to the studies of the fungus and more to the production of wilt-proof strains.

Section B

The second phase of wilt work at Dharwar can be said to be mainly concentrated in isolation of wilt-resistant varieties by breeding methods, since 1934. Though the correlation established between the soil temperature and the development of the disease cannot be made use of in devising controlled measures under field conditions, it has helped in understanding the nature of environment in relation to its occurrence. This discovery has also been helpful in evolving a special technique for the production of wilt-resistant cottons. In short, the method consists of growing plants in pot-culture under optimum conditions for

disease development for a period of two months, and transferring the survivals of such rigorous tests to the field for propagation. It may be stated here that conditions for wilt development are quite favourable from June to September under Dharwar conditions. Therefore, the temperature factors could be also utilised quite successfully in testing resistant cultures under conditions at Dharwar.

The inheritance studies of Fusarium resistance in Indian cottons conducted at Dharwar revealed the following findings:—(1) Absence of differential genetic basis for wilt resistance in the Indian Cotton varieties belonging to *Gossypium herbaceum* as well as *G. arboreum* species. (2) The resistance to wilt in Indian cotton varieties is based on two complementary dominant genes. There is a third gene in addition, an inhibitor which, when present, inhibits completely even the combined expression of both the resistant genes.

(Late) Rao Sahib G. L. Kottur was the first to tackle the work of evolution of wilt-resistant types from the Kumta variety cotton. It was he who was able to evolve K.F.T.-12-2-5 a cent per cent. wilt-resistant cotton in India. The wilt disease appeared in the local Kumta cotton in the year 1917, but the percentage of attack was not more than 5 per cent. for the whole of the farm. At this time it was decided to sow the whole area with Dharwar-1, an improved type selected from the local bulk. This also happened to be susceptible to wilt. Soon afterwards, the disease became very severe in Dharwar-1 cotton. The breeding area and the farm became infected, as many of the cottons grown in the area were more susceptible than Dharwar-1. Since the susceptibility of Dharwar-1 has been repeatedly proved year after year, it is taken as a reliable indicator of wilt and its virulence, and used as a standard, while comparing other Asiatic cottons from the point of resistance to wilt. Dharwar-2 is another type of cotton originated in the same way as Dharwar-1. It slightly differs from the latter in being more bushy, and having a shorter and coarser stable. But, in the point of behaviour towards wilt the two differ remarkably, Dharwar-1 being susceptible and Dharwar-2 resistant to it. Like Dharwar-2, there were a number of cottons, selected specially for wilt resistance, from Kumta and other varieties. Some of these selections were found to resist wilt even better than Dharwar-2. (They are K.B. 1, K.W.R., K.B. 7 from Kumta bulk—*G. herbaceum*; Wagale and Shaw, verum 262-2-4, verum 262-2-7 from *G. neglectum* ; and Comilla from *G. cernuum*). Some of the commercial cottons, which are highly susceptible to wilt, may contain resistant types. Such varieties when continuously grown in wilt-sick soil improve in resistance character, due to the elimination of the susceptible types, which is very rapid under highly infected conditions,

By growing Kumta bulk continuously in the wilt-sick soil for a number of years, a cent per cent. wilt-resistant type, *viz.*, K.F.T. 12-2-5 was obtained. This type was further tested for resistance under controlled conditions at Poona. It also withstood the rigorous test and proved its resistance to the disease even under controlled conditions.

Though K.F.T. 12-2-5 is highly resistant to wilt, since it possesses a low ginning outturn, it could not be recommended as such for general cultivation. However, this was used freely in hybridisation work as one of the parents to induce disease resistance in the susceptible types that are otherwise desirable, from the point of yield and fibre qualities. It also figured prominently as one of the parents while making inheritance studies to understand the genetic basis of inheritance.

At Dharwar, the object of cotton improvement work be said to be two-fold, *viz.*, (1) improvement of Kumta Cotton for yield and fibre qualities and (2) to build up or evolve wilt-resistant strains, coupled with desirable economic characters. Therefore, breeding superior 'desi' cottons went hand in hand with the evolution of wilt-resistant strains. In fact, a review of wilt breeding work will also entail a review of cotton improvement work done at this station. Briefly stating, Dharwar-1 and Dharwar-2 are the earliest promising selections that were selected from the local Kumta bulks in the year 1918. Neither of these improved strains could go into general cultivation as such, replacing the local Kumta, though each of them had to its credit, one or more characters superior to the local. This is because, these, in addition, showed some serious drawbacks, *viz.*, Dharwar-1 was highly susceptible to wilt, while Dharwar-2 was economically not desirable. A cross between Dharwar-1, and Dharwar-2 was effected. From this combination, a new strain, *viz.*, Jayawant emerged into the picture in the year 1928. This showed 94 per cent. field resistance to wilt, with high susceptibility under controlled conditions (*i.e.*, in pot studies). This new variety Jayawant which combined in itself the desirable characters of both Dharwar-1 and Dharwar-2 was given out for cultivation and it remained popular in the entire Kumta cotton-growing tract, till it was replaced by Jayadhar in 1950.

In order to improve the ginning characters of Dharwar-1, a cross between (Dharwar-1 × Rosea) was effected, and from this combination a type, *viz.*, 1-A-14-3 with 36 per cent. ginning was isolated.

As stated earlier, it was found possible to build up cent per cent. to wilt-resistance by growing susceptible types continuously in wilty soil over a number of years. This line of work was persued with the object of getting a 100 per cent. wilt-resistant Kumta strain. The outcome of it was K.F.T. 12-2-5, which proved to be cent per cent. resis-

tant to wilt, both under field conditions, and as well as under pot studies. The only drawback of K.F.T. 12-2-5 was low ginning outturn (24 per cent.). With a view to combine the desirable economic characters of Jayawant on the one hand and resistance character of K.F.T. on the other, a large number of combinations of crosses, both straight and back-crosses, were effected. In addition, wilt-resistant strains like Wagale, K.W.R. were also utilised as one of the parents in hybridization work. Testing in pots is always done when a resistant type is obtained under field conditions. The main principle underlying the testing in pots is that we can put the host plants in a condition such that it can best be acted upon for attack by the parasite; by creating favourable environmental conditions. An intensive study of the hybrid material so built up resulted in the isolation of a new type having all the desirable economic characters, combined with 100 per cent. resistance to wilt under field conditions, with only 2 per cent. susceptibility in pot-culture studies. This culture was christened as 'Jayadhar' and released for general cultivation in the year 1950. It has now completely replaced the earlier strain Jayawant and occupies the entire 'desi' cotton area, because of its high popularity among the cultivators. The improved strains evolved at the Agricultural Research Station, Dharwar, from time to time, along with their pedigree and trade qualities are presented in Annexure I appended.

Further work was carried out on cultures having resistance less than 100 per cent. to build up a type which shows cent per cent. resistance, both in field, and as well as in pot-culture studies and, in addition, showing all the desirable economic characters. Some of these cultures which have proved their resistance even under rigorous pot tests are now under preliminary yield trials. It is hoped that a 100 per cent. wilt-resistant strain which, in addition, show improvements over Jayadhar will be released in the near future.

Summary and Conclusions

The importance of cotton wilt in the Karnatak zone is emphasized.

The causal organism of wilt in Indian Cottons has been established as due to the saprophytic fungus *Fusarium vasinfectum*.

The wilt disease is carried inside the seed. It is not indigenous to Karnatak, but was introduced from Broach tract.

The cultural and nutritional studies of the fungus were studied in detail.

The method of testing cotton types for wilt-resistance was standardised.

Studies on physiologic specialisation in *Fusarium vasinfectum* failed to reveal any differences in respect of pathogenicity.

A strong case has been made out for studying the biochemical aspects of the cotton plant. This merits special consideration in any future line of cotton wilt work, since it helps to fully understand the nature of disease-resistance.

Inheritance studies revealed that the resistance in Indian Cotton varieties is based on two complementary dominant genes, with a third inhibitory gene when associated with them; inhibits completely even the combined expression of both the resistant genes.

American uplands were found to be immune to *Fusarium* wilt under Indian conditions.

Breeding of wilt-resistant studies were crowned with success, by realising highly wilt-resistant strains of cotton like K.F.T. 12-2-5 (immune), Jayawant and Jayadhar.

Acknowledgements

The author expresses his appreciation to Dr. H. R. Arakeri, Joint Director of Agriculture (Research and Education), Bangalore, for criticism of the manuscript.

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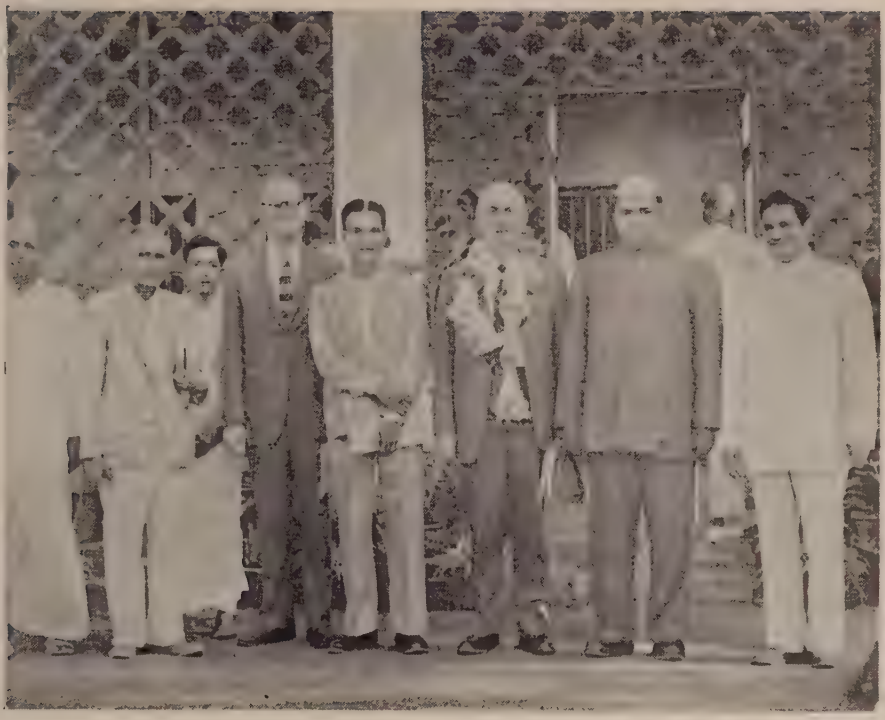
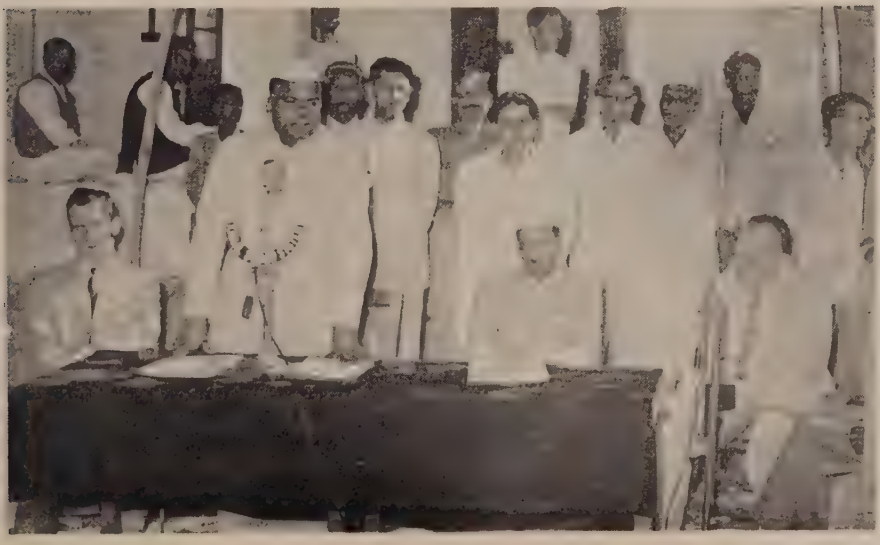
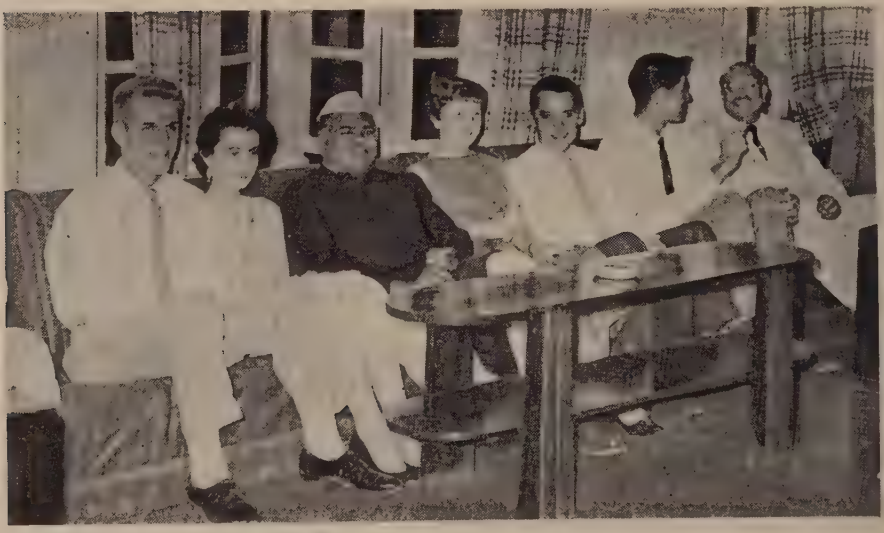


Dr. Tyler Wood, T. C. M. Chief, at the Forum



West German Party at the Kumbalgod Training Camp

American Farm Leaders on their Visit to the Mysore Farmers' Forum



American Young Farmers with the President, Mysore Young Farmers' Association and Director of Agriculture

REPORT OF THE HONORARY SECRETARY*

MR. PRESIDENT AND FRIENDS,

I am indeed happy to place before you the Report of the Mysore Farmers' Forum which gives you a brief account of its achievements in the year 1960–61 and its future programmes.

After the General Body Meeting which was held on the 23rd April 1960, the first Executive of the Forum met for the first time on the 3rd July 1960 at Nuggehalli, Hassan District. Since then the Executive has met five times. It has taken very important decisions in making the Forum more popular and strong among the farmers of the State.

The Executive for the first time constituted a Standing Committee and a Planning Committee. Now the Standing Committee is composed of all the Heads of Departments of the Government of Mysore. The Director of Agriculture is the Chairman of the Standing Committee. The Standing Committee met twice and have put forward very useful and important suggestions before the Executive. Most of their suggestions have been put to implementation and it is being followed up.

The Planning Committee is constituted of the members elected out of the Executive and one of our Vice-Presidents as Chairman. The Planning Committee met once and considered the Third Five-Year Plan draft pertaining to Agricultural Planning. Their observations have been forwarded to Government for inclusion in the Plan.

In this brief period there has been quite an enthusiastic response from the various District and Taluk Forums in the State. In the very first Executive Committee Meeting we decided to give Rs. 1,000 grant to each district in the State to carry out their programmes. I am happy to say many Taluk Forums have been constituted in this period and they have been working satisfactorily. These District and Taluk Forums have taken steps to acquire land for the construction of Forum buildings in the district and taluk headquarters. I am glad to inform you the Bellary District Forum building foundation will be laid by our beloved President, Sri. N. Rachiah, on the 10th June 1961. The other two districts, Tumkur and Belgaum, are making arrangements to collect funds for the building. I am proud to say that the Forum has got its

* Report of Sri. M. V. Rajasekharan, Hon. Secretary, Mysore Farmers' Forum, placed before the General Body Meeting, held on 31st May 1961, at Sir K. P. Puttanna Chetty Towu Hall, Bangalore.

own buildings in the two district headquarters and two taluk headquarters apart from its beautiful Central Office building which is in the Capital City of Mysore State. I have no doubt we will have our own Farmers' Forum buildings in all the 19 district headquarters of the State within a year or two.

The Forum State Office has been thoroughly reorganised. It has been made to attend all enquiries which would come from all over the State. Now the Office is in a position to give proper facilities and information to our farmers. A small Bee-keeping Project has been put in the compound of our Office for the benefit of our visiting farmers and young farmers.

Membership.—Our Membership during the year 1960–61 has increased from 5,200 to 8,136. I am happy to say that our membership is increasing steadily every month. Today its membership stands at 10,000.

To increase the membership we had taken a decision to award prizes to individuals who enrol highest number of members in a Taluk. In pursuance of that decision today we are giving three prizes to the Taluks who have secured I, II and III prizes in the membership competition. We are also giving a Rolling Shield to the District which has enrolled the highest number of members during the year 1960–61.

Library and Information Centre.—Our Library and Information Centre has been made more attractive to give better service to our members. At present we have 2,000 volumes on different aspects of Agriculture. We have decided to add books worth about Rs. 5,000 every year to our Library. In pursuance of that decision an order has been placed to purchase books worth Rs. 3,300 for the use of farmers.

Our Information Centre now is in a position to give a bird's eye-view of improved practices in agriculture which is being practised throughout the world. I am happy to inform you that we are getting nearly 120 journals and periodicals as exchange from all over the world.

Journals and Publications of the Forum.—During 1960–61, our Journals both in Kannada and English have been made more attractive. More pages have been added to both the Journals giving important information on various topics of Agriculture. Separate pages have been reserved for questions and answers directly from our farmers. Now our circulation of Kannada Journal is 10,000 and English 700. The circulation is increasing steadily every month corresponding to the increase in membership.

The Forum in this year has brought out very useful publications. One is *Handbook on Agriculture* and the other is *Farm Accounts.*

The Executive Committee had taken a decision to organise the Farmers' Forum Co-operatives in all the district and taluk headquarters. The steps have already been taken to give effect to this resolution.

Forum Van.—In pursuance of the resolution passed by the Executive Committee recently, one Willy's 4-Wheel Drive Station Wagon has been purchased at a cost of Rs. 24,320 by the Farmers' Forum,. This van is being made use of for the propagation of the objectives of the Forum in the State. I hope we will be able to tour all over the State and organise the Forums better. We have got plans to equip the van with a projector and films. Sometime back I had approached the United States Information Service authorities to lend a projector to State Forum. I am happy to say they have complied with our request and we will be getting the projector by the end of next month. We hope to equip our van with this projector, so that we can project films on improved methods of Agriculture and other activities of Farmers' organizations.

Our Guests from Friendly Countries and Exchange of Farmers.—The Mysore Farmers' Forum has played as host to visiting farmers from America, Japan and other countries. These farmers from America and Japan stayed with our members and appreciated our progress.

Many *dignitaries* from other countries paid visits to our State Office. Among them are Mr. C. Tyler Wood, Minister of Economic Affairs and the Chief of the Technical Co-operation Mission of the United States of America; the First Secretary of Agriculture, the Embassy of West Germany; Delegation from Latin America; Secretary-General of Catholic Association of Belgium.

One of our members, Sri. Vishwanath, along with Sri. Chandregowda and Sri. Krishnappa, visited U.S.A. under Farm Leaders' Programme.

I am glad to inform you that one of our Vice-Presidents, Sri. Rayanagowda Patil from Belgaum District, is due to leave for U.S.A. today evening from New Delhi under Farmers and World Affairs Exchange Programme.

There were many groups of farmers who visited our State Forum from all parts of India. Most of the groups had come in large batches. Number of groups came and stayed in our "Farmers' Home" building which is attached to our State Office building. There have been an increasing number of such farmers visiting our State Office. Every month we are getting two to three such groups. We have already received information from Gujarat and Rajasthan that the farmers batch would be arriving in Bangalore next month. Proper arrangements for their visit are under way.

Meeting with Legislators.—All the Legislators of the Mysore State were invited to a meeting on the 15th April 1961 at the premises of our State Office to develop closer contact with them. Our aims and objectives were explained to them on that occasion. I am happy to say a number of Legislators have been taking keen interest in the Forum and helping us to build a very strong farmers' organization in the State.

Kisan Special Trains.—The Executive has decided to run Kisan Special Trains for the benefit of its members. I am happy to say that in pursuance of this resolution, the Government have passed orders permitting the Forum to run Kisan Special Trains. We should have run one Special Train by now but due to other works we could not organise. The Executive has also taken a decision to appoint a Special Officer to be put in charge of running Special Trains. Arrangements are being made to run two Special Trains in the current year for the benefit of our members.

First State Agricultural Fair.—An Agricultural Fair Committee has been constituted with our President, Sri. N. Rachiah, as the Chaliman. The Committee hopes to hold the first State Agricultural Fair by the end of this year.

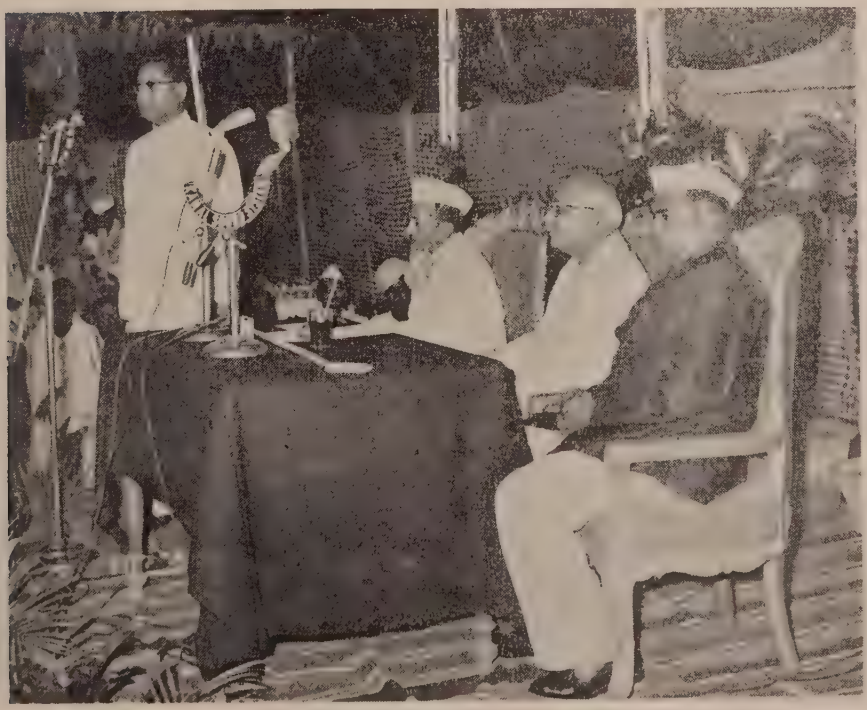
The Executive Committee has also decided to organise every year these Agricultural Fairs in all district and taluk headquarters.

National Farmers' Day.—On 3rd April 1961, the National Farmers' Day was celebrated at our State Office premises. It was a memorable occasion wherein prizes were awarded for the prize winners of the State Level Kharif Campaign Crop Competition. Sri. B. D. Jatti, Chief Minister of Mysore State, inaugurated the National Farmers' Day. Sri. S. Nijalingappa, President of Mysore Pradesh Congress Committee, distributed the prizes to the prize winners. Our President, Sri. N. Rachiah, presided over the function.

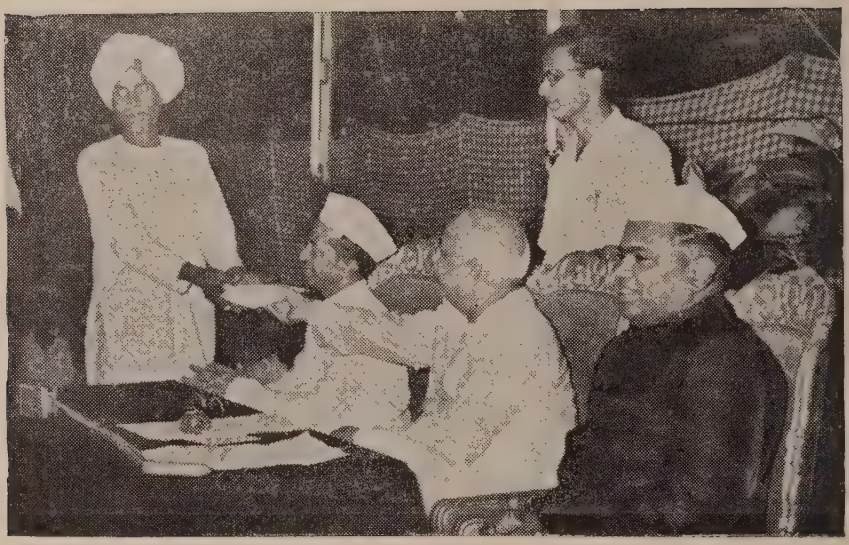
It makes me supremely happy to bring to your kind notice that Sri. S. Nijalingappa, Sri. B. D. Jatti and Sri. N. Rachiah, all the three enrolled as Life-Members of the Mysore Farmers' Forum on this National Farmers' Day. I am sure the above leaders will continue to take great interest in our organization hereafter and guide the farming community to achieve better results.

Cold Storage and Farmers' Forum Co-operatives.—In pursuance of the resolution passed by the Executive Committee, I am happy to inform you that the Mysore State Farmers' Forum Co-operative Cold Storage Society has come as a reality. A Board of Directors has been constituted to take up the construction and management of the Cold Storage Society. I am glad to inform you the Government of Mysore

Japanese Youth Delegation with Members of the Mysore Farmers' Forum and Young Farmers' Association



National Farmers' Day : Vice-President L. T. Karle Welcoming the Guests



Top Kharif Crop Winner receiving his Prize from the President, Mysore Pradesh Congress Committee

Kharif Crop Winners with the Chief Minister and Minister for Agriculture, National Farmers' Day

has been pleased to sanction a loan of Rs.4 lakhs towards the construction and operation of the above Society. On behalf of our Executive Committee and on behalf of all of you I sincerely thank the Government of Mysore for their timely gesture. The Cold Storage Society will have a share capital of Rs. 10 lakhs, with its initial capacity of 1,200 tons.

Printing Press.—As you are all aware we are spending every year 30–40 thousand rupees on printing. To save a lot of expenditure on this the Executive Committee has taken a decision to purchase a Printing Press. In this connection the Government of Mysore has been requested to give a long-term loan of Rs. 50,000 to the Forum for the purchase of a Printing Press.

We are also at the same time pursuing the Government to divert Rs. 50,000 to Farmers' Forum to purchase a Printing Press out of the money which has been given to Mysore State as a first prize in the Kharif Crop Competition.

I hope we will be able to have our own Printing Press in the current year.

We, the Executive Committee Members, have taken decisions on number of important subjects which are still pending implementation:

1. To set up an Agricultural Museum in the Capital City of Bangalore and in all district headquarters.
2. To set up model farms in all the 4 divisions of the Mysore State.
3. To run Agricultural Schools in the State.
4. To get licence from the Government of Mysore to manufacture wine out of Bangalore Blue Grapes.
5. To construct auditoriums.
6. To hold training for women in fruit and vegetable canning.
7. To hold training for Presidents of District and Taluk Forums, B.D.O.'s and Agricultural Extension Officers.
8. To hold State Competition in Kharif and Rabi Campaigns.
9. To organise District and Taluk Farmers' Forum Co-operatives.
10. To request Central and State Governments to give licence to Farmers' Co-operatives to import Tractors and Bulldozers and other allied agricultural implements.
11. To request the Government to entrust the distribution of fertilisers in the State to Farmers' Forum Co-operatives.

12. To request the Government to give 20 acres of land in the campus of Agricultural College, Hebbal, to construct Farmers' Home and all buildings of Farmers' Forum.

I am happy to bring to your kind notice that we are corresponding with various agencies in India to get a soil testing mobile van, a mobile canning unit, as a gift to the Forum. Let us hope we will succeed in this endeavour.

We have also got plans to have our own Mobile Library which can supply books to farmers who are residing in distant places on topics of Agriculture.

I have just placed before you some of the major achievements and future programmes. There are lot of things which we have to achieve in the coming years. But whatever we have achieved and implemented so far, the credit of it should go to our able President, Sri. N. Rachiah. It will not be an exaggeration if I say that he is the living spirit behind the organization.

I am happy to say that our relationship with the Department of Agriculture is most cordial and co-operative. I have no doubt our co-operative efforts will give better service to our farmers to improve their standard of living.

I should also thank all the members of our Executive Committee who gave their closest co-operation during the meetings and after implementing the resolutions. I should specially thank our Vice-Presidents, Sri. L. T. Karle and Sri. Rayanagowda Patil, who gave their valuable advices and guided the work of the Forum.

I will be failing in my duty if I do not record the assistance given by our Secretary and other members of our staff during my work of the office.

I wish to conclude my report with a request to my collegues and friends to take up enrolment of membership more vigorously in their respective areas.

I specially appeal to all of you to wipe off lethargy and set up an example in building a strongest Farmers' Organization in the State.

Once again I thank you all for your co-operation.

"JAI HIND"

STATEMENT SHOWING THE POSITION OF MEMBERSHIP OF THE MYSORE FARMERS' FORUM AS ON 31ST MARCH 1961

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
1	*Bangalore District*					
	Bangalore North ..	86	15	11	5	..
	Bangalore South ..	226	53	59	2	..
	Hoskote	162	6	57	1	3
	Doddaballapur ..	62	9	4	..	..
	Nelamangala ..	61	14	24	..	..
	Magadi	31	2	..	..	..
	Kanakapura ..	57	4	..	..	..
	Ramanagaram ..	12	5	..	..	..
	Devanahally ..	69	3	..	..	1
	Anekal	64	1	20	..	10
	Channapatna ..	58	6	12	..	..
	TOTAL ..	888	118	187	8	14
2	*Kolar District*					
	Kolar	88	5	13	..	5
	Bangarpet ..	71	5	23	..	..
	Chintamani ..	..	4	..	..	..
	Mulbagal	37	7	..	..	..
	Siddlaghatta ..	34	2	..	..	..
	Chikkaballapur ..	76	2	..	..	..
	Bagepalli	49	1	..	..	..
	Gouribidnur ..	73	1	..	..	..
	Malur	92	2	18	..	..
	Gudibanda ..	28	..	..	..	..
	Srinivasapur ..	28	..	..	..	5
	TOTAL ..	576	29	54	..	10

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
3	*Tumkur District*					
	Tumkur	13	3	..	..	..
	Madhugiri ..	75	..	..	..	28
	Chiknaikanahally ..	26	1	..	..	..
	Sira	56	3	..	..	..
	Gubbi	61	2	..	..	5
	Tiptur	39	2	11	..	9
	Pavagada ..	48	1	3	..	..
	Kunigal	51	3	3	..	..
	Koratagere ..	35	..	..	..	10
	Turuvekere ..	5	3	..	..	..
	TOTAL ..	409	18	17	..	52
4	*Mandya District*					
	Mandya	94	16	..	..	..
	Srirangapatnam ..	299	1	151	..	4
	Malavalli ..	113	..	..	..	..
	Krishnarajapet ..	72	2	..	..	..
	Nagamangala ..	25	..	..	..	10
	Maddur ..	270	9	73	..	9
	Pandavapura ..	126	4	42	..	112
	TOTAL ..	999	32	265	..	135
5	*Mysore District*					
	Mysore	12	22	1	..	..
	Chamarajanagar ..	75	7	..	..	..
	Hunsur	46	27	6	..	5
	Krishnarajanagar ..	3	5	..	..	18
	Heggadadevanakote	8	2	..	..	..
	Gundlupet ..	37	10	..	..	..
	Nanjangud ..	270	6	2	..	..
	T. Narasipur ..	..	15	..	..	..
	Periyapatna ..	50	15	11	..	..
	Kollegal	17	..	..	..	..
	Yelandur	23	..	3	..	..
	TOTAL ..	541	109	23	..	23

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
6	*Hassan District*					
	Hassan	292	7	99	..	34
	Sakleshapur ..	58	4	..	..	..
	Arkalgud ..	89	6	48	..	6
	Belur	11	5	..	..	..
	Channarayapatna ..	23	2	15	..	..
	Arsikere	104	11	80	1	..
	Holenarasipur ..	87	5	14	..	..
	Alur	31	1	4	..	..
	TOTAL ..	695	41	260	1	40
7	*Shimoga District*					
	Shimoga ..	7	17	..	..	..
	Channagiri ..	23	8	1	..	4
	Honnali	4	4	..	..	..
	Shikaripur ..	4	5	..	..	..
	Sorab	40	5	21	..	..
	Sagar	12	6	..	..	..
	Hosanagar ..	..	..	..	..	..
	Thirthahalli ..	74	16	6	..	..
	Bhadravathi ..	115	5	29	..	..
	TOTAL ..	279	66	57	..	4
8	*Bidar District*					
	Bidar	3	..	..	..	..
	Bhalki	2	..	..	..	..
	Sathapur ..	..	..	..	..	..
	Humanabad ..	1	..	..	..	..
	TOTAL ..	6	..	..	..	..

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
9	*Chikmagalur District*					
	Chikmagalur ..	157	6	..	..	..
	Kadur	41	..	..	..	15
	Tarikere	41	..	32	..	15
	Koppa	140	6	9	..	5
	Mudigere ..	97	4	..	..	..
	Narasimharajapur	37	1	..	..	..
	Sringeri	65	3	6	..	..
	TOTAL ..	629	23	47	..	20
10	*Chitradurga District*					
	Chitradurga ..	401	18	152	3	..
	Chellakere ..	173	21	10	..	4
	Hiriyur	38	13	..	..	..
	Holalkere ..	20	..	..	..	..
	Malakalmuru ..	13	..	..	..	..
	Davanagere ..	11	5	..	..	..
	Jagalur	36	1	..	..	..
	Hosadurga ..	57	..	20	..	..
	Harihar	15	2	..	..	..
	TOTAL ..	764	60	182	3	4
11	*Bellary District*					
	Bellary	74	1	..	..	..
	Siruguppa ..	35	3	..	..	..
	Hospet	2	34	..	..	..
	Hadagally ..	47	5	3	..	..
	Harapanahally ..	24	..	..	..	..
	Kudligi	29	15	..	..	..
	Sandur	..	..	..	..	..
	TOTAL ..	212	58	3	..	..

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
12	*North Kanara District*					
	Karwar ..	19	..	..	..	..
	Ankola ..	..	..	..	..	..
	Kumta ..	91	..	5	..	..
	Honnavar	38	..	..	..	..
	Bhatakal ..	..	..	..	..	..
	Halyal ..	..	1	..	..	..
	Soopa ..	..	..	..	..	..
	Yellapura	..	..	..	..	..
	Mundagod	1	..	1	..	..
	Sirsi ..	31	..	5	..	..
	Siddapura	39	1	..	..	..
	TOTAL	219	2	11	..	..
13	*Coorg District*					
	Coorg-Mercara	336	2	..	..	2
	Somwarpet	20	..	..	..	..
	Ponnampet	12	..	..	..	..
	TTOAL	368	2	..	..	2
14	*Dharwar District*					
	Dharwar	13	2	..	..	2
	Hubli ..	111	1	..	..	..
	Kalghatgi	12	..	..	..	..
	Shiggaom	16	..	..	..	..
	Hangala ..	1	..	..	..	..
	Hirekerur	4	..	..	..	..
	Ranebennur	14	1	8	..	..
	Haveri ..	28	..	..	..	..
	Gadag ..	6	1	..	..	1
	Mundargi	24	..	..	..	..
	Navalgund	25	..	..	..	..
	Nargund	38	..	..	..	1
	Ron ..	56	..	2	..	..
	Savanoor	..	..	..	..	..
	Sirahatti ..	5	..	..	..	..
	Kundagola	26	..	..	..	..
	TOTAL	379	5	10	..	4

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
	2	3	4	5	6	7
15	*Bijapur District*					
	Bijapur ..	9	1	1	..	..
	Indi ..	76	..	..	..	..
	Sindhagi	..	..	..	..	..
	Bagewadi	..	..	..	..	..
	Muddebihal	95	1	9	..	1
	Bagalkot	26	..	..	..	..
	Bilgi ..	16	..	..	..	..
	Badami ..	2	..	..	..	..
	Hunagund	..	2	..	..	..
	Jamakhndi	60	..	5	..	..
	Mudhol ..	2	..	..	..	73
	TOTAL ..	286	3	15	..	74
16	*Belgaum District*					
	Belgaum ..	1	2	..	..	1
	Khanapura	..	..	..	..	....
	Bailhongal	12	..	..	..	..
	Saundatti	10	..	..	..	..
	Gokak ..	25	1	..	..	..
	Chikodi	170	36	..	..	..
	Hukkeri	47	1	..	..	..
	Athani ..	80	2	12	..	1
	Raibagh ..	86	..	..	..	..
	Ramadurg	..	..	..	..	..
	Parasagada	..	..	..	..	..
	TOTAL ..	431	42	12	..	2
17	*Gulbarga District*					
	Gulbarga	4	..	..	..	..
	Yadagiri	..	..	..	..	..
	Chincholi	139	..	..	..	..
	Seerum ..	6	..	..	..	..
	Shahapur	..	..	..	..	..
	Jeevargi ..	5	..	..	..	..
	Shorapura	..	..	..	..	..
	Afzalpura	1	4	..	..	..
	Aland ..	2	1	..	..	..
	Chithapura	4	..	1	..	..
	TOTAL ..	161	5	1	..	..

Sl. No.	Name of the District/Taluk	Members enrolled from 1st April 1960 to 31st March 1961		Members enrolled during the month of March 1961		Membership expired during the month of March 1961
		Active	Life	Active	Life	
1	2	3	4	5	6	7
18	*Raichur District*					
	Raichur	1	..	..	..	..
	Lingsugur ..	..	..	..	..	..
	Hatticamp ..	..	..	..	..	..
	Manvi	47	..	1	..	..
	Devadurg ..	..	..	..	..	..
	Kushtagi ..	4	..	4	..	..
	Sindhanur ..	..	..	..	..	..
	Kuppagi ..	..	..	..	..	..
	Gangavathi ..	1	..	..	..	..
	Koppal	5	..	..	..	..
	Munirabad ..	..	1	..	..	..
	TOTAL ..	58	1	5	..	..
19	*South Kanara District*					
	Hosadurga ..	..	..	..	..	..
	Puttur	63	4	9	..	..
	Belthangady ..	6	..	1	..	1
	Bhantawal ..	4	..	..	..	..
	Mangalore ..	7	..	..	..	..
	Mulki	..	..	..	..	..
	Karkala	31	..	14	..	..
	Udipi	42	..	..	..	5
	Coondapoor ..	74	..	..	..	..
	Suliya	..	..	..	..	..
	Mudibidre ..	1	..	1	..	..
	Hebri	..	..	..	..	..
	Brahmavara ..	8	..	8	..	..
	TOTAL ..	236	4	33	..	6
	MISCELLANEOUS ..	1	4	..	..	..
	GRAND TOTAL ..	8,136	622	1,172	12	390

MYSORE FARMERS' FORUM,

Income and Expenditure Account

EXPENDITURE

		Rs. nP.
To Establishment Charges		7,813·25
,, Printing Charges		784·30
,, Stationery Expenses		1,589·23
,, Postal Account—		
Opening Balance	6·71	
Add Stamps during the year	2,793·80	
	2,800·51	
Less Value of Stamps on Hand	8·78	
		2,791·73
,, Contingencies		1,741·97
,, Subscription to Periodicals and Newspapers		197·27
,, Payment to Bangalore Press	29,743·75	
Less Last Year's Arrears	5,152·35	
	24,591·40	
Add Arrears Outstanding	4,753·54	
		29,344·94
,, Telephone and Telegraph Charges		1,074·30
,, Electricity Charges		1,120·79
,, Guest Charges		1,859·31
,, General Body Meeting Expenses		594·01
,, Expenses of Special Meetings		772·74
,, Travelling Allowance to Staff		36·18
,, Travelling Allowance to Executive Committee Members		2,330·81
,, Bank Commission		18·76
,, Miscellaneous Expenses		73·70
,, Payment to Taluks and Districts for enrolling Members		139·96
,, Matching Grants to Districts		4,000·00
,, Contribution to Staff Provident Fund		171·94
,, Purchase of Ashoka Pillars as a Gift to U.S.S.R.		331·80
,, Audit Fee	150·00	
Add Outstanding Fee for this year	50·00	
		200·00
,, Depreciation—		
On Library Books	87·00	
On Furniture	372·00	
On Typewriter	60·00	
On Duplicator	63·00	
		582·00
TOTAL		57,568·99

Hanuman Buildings, Chickpet,
BANGALORE CITY,
Dated 15*th May* 1961.

CENOTAPH ROAD, BANGALORE-2
for the Year Ended 31st March 1961

INCOME

	Rs. nP.
By Membership Fee	42,273·99
,, Primary Membership Fee	190·81
,, Delegate Fee	90·00
,, Advertisement Receipts	2,402·67
,, Interest	183·92
Sale of Old Books	3·50
By Recovery of Telephone Charges	7·96
,, Miscellaneous Account	201·16
,, Excess of Expenditure over Income	12,214·98
TOTAL ..	57,568·99

(Sd.) A. R. RANGASWAMY,
Restricted State Auditor.

MYSORE FARMERS' FORUM,

Balance Sheet as at

CAPITAL AND LIABILITIES

	Rs. nP.	Rs. nP.
Admission and Life-Membership Account—		
Balance as per last year's Balance Sheet ..	35,900·77	
Add Receipts of Life-Membership Fee during the year	4,715·06	
		43,315·83
Excess of Income Over Expenditure Account—		
Balance as per last year's Balance Sheet ..	41,224·72	
Less Excess of Expenditure over Income during the year	12,214·98	
		29,009·74
Outstanding Payments to Bangalore Press ..		4,753·54
Outstanding Audit Fee		50·00
Advance from Young Farmers' Rally ..		116·00
Staff Provident Fund Account		2,711·66
Carried Over ..		79,956·77

CENOTAPH ROAD, BANGALORE-2

31st March 1961

ASSETS AND PROPERTIES

	Rs. nP.	Rs. nP.
Cash on Hand		3,018·59
Cash at Huzur Treasury		396·99
Cash at State Bank of Mysore		9,787·38
Cash Orders (Returned)		55·00
Excess Provident Fund Contribution		8·06
Stamps on Hand		8·78
Library Books—		
Opening Balance	341·08	
Additions during the year	39·24	
	380·32	
Less Depreciation	87·00	
		293·32
Furniture—		
Opening Balance	2,778·95	
Additions during the year	2,757·29	
	5,536·24	
Less Depreciation	372·00	
		5,164·24
Typewriter—		
Opening Balance	424·31	
Less Depreciation	60·00	
		364·31
Duplicator—		
Opening Balance	680·15	
Less Depreciation	63·00	
		617·15
Office Equipment		606·39
Willy's Station Wagon		24,084·66
Advance to Staff—		
Opening Balance	839·59	
Less Recoveries during the Year	595·00	
		244·59
Festival Advances		518·00
Seminar Advance		106·65
Carried Over		45,274·11

MYSORE FARMERS' FORUM,

Balance Sheet as at

CAPITAL AND LIABILITIES

	Rs. nP.	Rs. nP.
Brought Forward ..		79,956·77
TOTAL ..		79,956·77

Hanuman Buildings, Chickpet,
BANGALORE CITY.
Dated 15th May 1961.

CENOTAPH ROAD, BANGALORE-2

31st March 1961

ASSETS AND PROPERTIES

	Rs. nP.	Rs. nP.
Brought Forward ..		45,274.11
Advance to Officials		532·00
Fixed Deposit at Huzur Treasury—		
Opening Balance	5,500·00	
Less Withdrawals during the year ..	3,100·00	
		2,400·00
Fixed Deposit with Reserve Bank of India—		
Opening Balance	15,294·00	
Add Deposit during the year	800·00	
		16,094·00
Loan Bonds		3,570·00
Deposit with Southern Railways		1,200·00
Fixed Deposit with State Bank of Mysore ..		3,000·00
Deposit with Cold Storage Society		5,000·00
Security Deposit at Post Office, Bangalore ..		175·00
Staff Provident Fund Investment Account—		
In State Huzur Treasury	2,396·66	
Advances to Staff	315·00	
		2,711·66
TOTAL ..		79,956·77

(Sd.) A. R. RANGASWAMY,
Restricted State Auditor.

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